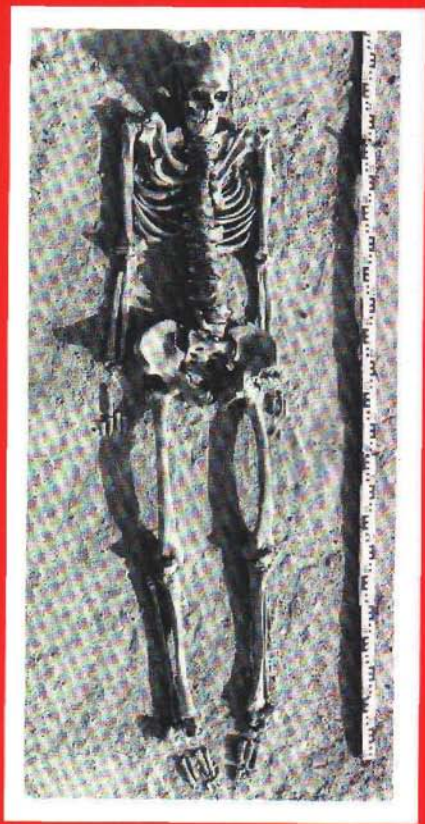
THE MANKIND QUARTERLY



VOLUME XXXIX Number 2 Winter 1998

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The Pivot of Civilization

Margaret Sanger

Introduction by

H. G. Wells

Paperback, 284 pages
Reprint of 1922 edition

With Preface to the current printing by J. W. Jamieson

CONTENTS

In a plain and lucid style without any emotional appeals, Mrs. Margaret Sanger sets out the case of the new order against the old. ... The New Civilization is saying to the Old: "... we cannot go on giving you health, freedom, enlargement, limitless wealth, if all our gifts to you are to be swamped by an indiscriminate torrent of progeny. We want fewer and better children, who can be reared up to their full possibilities in unencumbered homes, and we cannot make the social life and world peace we are determined to make, with the ill-bred, ill-trained swarms of inferior citizens that you inflict upon us. — *H.G. Wells*

ISBN 0-941694-27-9 • Price: $20.00
VISA AND MASTERCARD ACCEPTED

Scott-Townsend Publishers
P.O. Box 34070, N.W. Washington D.C., 20043
Tel: (202) 371-2700 • Fax: (202) 371-1523

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Vol. XXXIX, No. 2 Winter 1998

THE MANKIND QUARTERLY

EDITORIAL COMMITTEE

PETER BOEV (Sofia, Bulgaria)
BRUNETTO CHIARELLI (Florence, Italy)
HANS W. JÜRGENS (Kiel, Germany)
RICHARD LYNN (Coleraine, Northern Ireland)
EDGAR C. POLOMÉ (Austin, Texas)

EDITORIAL ADVISORY BOARD

Tadeusz Dzierżykray-Rogalski, Warsaw, Poland; J. Gladykowska-Rzeczycka, Gdansk, Poland; J. Balslev Jorgensen, Copenhagen, Denmark; David de Laubenfels, Syracuse, New York; T.L. Markey, Ann Arbor, Michigan; Umberto Melotti, Milan, Italy; Clyde E. Noble, Athens, Georgia; Jens Palsson, Reykjavik, Iceland; Ralph M. Rowlett, Columbia, Missouri; Frederick J. Streng, Dallas, Texas; Charles C. Susanne, Brussels, Belgium; Daniel R. Vining, Philadelphia, Pennsylvania; Volkmar Weiss, Leipzig, Germany.

FOUNDER AND FORMER EDITOR-IN-CHIEF
The late Robert Gayre of Gayre (Edinburgh, Scotland)

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

VOLUME XXXIX, No. 2 Winter 1998

CONTENTS

Drivers of Intelligence Evolution in *Homo*: Sexual Behavior, Food Acquisition and Infant Neoteny
Kanetoshi Hattori 127
A Giant from Ostrów Lednicki (XII-XIII c), Dist. Lednogóra, Poland
J. J. Gladykowska-Rzeczycka, A. Śmiszkiewicz-Skwarska, and A. Sokól 147
MacLean's Triune Brain and the Origin of the "Immense Power Being" Idea
M. Ernandes and S. Giammanco 173
Music and Peak Experiences: An Empirical Study
Michael J. Lowis 203
Overpopulation and the Threat of Ecological Disaster: The Need for Global Bioethics
Brunetto Chiarelli 225
Race is More than Skin Deep: A Psychologist's View
J. Philippe Rushton 231
Book Review 250

Cover Picture: Skeleton of a female giant thrown carelessly into her grave [*See Article:* Giant from Ostrów Lednicki (XII-XIII c)]

The Mankind Quarterly is a refereed quarterly journal published by Scott-Townsend Publishers, P.O. Box 34070, NW Washington DC 20043, U.S.A. Telephone (202) 371-2700. Fax (202) 371-1523. Manuscripts for publication may be submitted to that address in two copies, laid out according to the Chicago Manual of Style. The price of subscriptions is $27.50 per annum for students, $40.00 per annum for private individuals, and $80.00 per annum for libraries, institutions and other corporate bodies. Special reduced three-year subscription rates are available, at a cost of $97.50 for private individuals (twelve issues) and $220.00 for libraries and other corporate bodies (twelve issues). Foreign postage: add $8.00 per annum for shipment to non-U.S. addresses.
Copyright 1998 ISSN 0025-2344

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Drivers of Intelligence Evolution in *Homo*: Sexual Behavior, Food Acquisition and Infant Neoteny

Kanetoshi Hattori[1]
National Rehabilitation Center for the Disabled, Tokorozawa, Japan

There are many hypotheses on language and IQ evolutions, but many failed to explain sex differences of IQ. Some discussions presuppose that only Homo has language and that this appeared suddenly. Molecular level evolution does not support any sudden appearance of language. Bipedality amongst Homo was a factor in the evolution of many modern aspects of Homo; changes in copulation behavior contributed to the evolution of language; bipedality produced a larger brain, but blocked enlargement of the parturient canal and retarded further increases in the size of the brain. The female Homo was forced to deliver the neonate in a state of neoteny. Females further evolved language in order to take care of the infants. Male Homos accelerated food acquisition activities to provide the energy required to maintain a larger brain. The male Homo lost the initiative in sexual intercourse at female's mating season and began to depend on language from the female as a signal for mating. Females who acquired the initiative in copulation begun to select male partners by their ability to provide food and security. By this sexual selection, the evolution of language was accelerated. Neoteny, although physically disadvantageous, assisted neural development. Homo developed the ability to accumulate more information, a process in which language played a crucial role.

Key Words: *Homo Sapiens,* evolution, language, neural development, intelligence, bipedality, copulation.

Introduction

Although there have been hypotheses on evolution of language which comprises a quite important part of intelligence, many of these explained this evolution in terms of early human collaboration for the

[1] Send correspondence to: National Rehabilitation Center for the Disabled 4-1 Namiki, Tokorozawa City, Saitama Pref., Japan. ZIP359-0042. E-mail: hattorik@mx6.mesh.ne.jp

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

purpose of hunting, escaping from dangerous animals, and other production activities which were primarily engaged in by males (Kimura, 1987). The hypotheses failed to explain the sex differences in verbal and performance IQs as reported by many researchers (Rushton, 1992; Halpern, 1996, 1997; Lynn, 1996; Lynn, 1998; Sanders & Wright, 1997). In addition to the psychometric data on sex difference, there is evidence of sex differences in brain anatomy (Reiss, et al., 1996; Shaywitz, et al., 1995; Sanders, 1998). Evolution of performance IQ is explainable by hunting and other production activities, but that of verbal IQ is not explicable by production activities. The higher verbal IQ of females and the common sense of talkative females must be explained by evolution pressure on females.

In the beginning was the word! There are researchers who consider that language is a unique ability acquired only by mankind (Chomsky, 1988; Pinker, 1994). These researchers believe that language appeared very recently in the history of the evolution, as a result of one or more sudden mutations. However, molecular genetics does not support such rapid evolution by mutation. Mutations are almost always dangerous for the existence of a species, and the probability that positive, not dangerous, changes result from any specific mutation is extremely small. Molecular genetics confirms that the evolution of language did not happen suddenly. Behavioral level evolutional hypotheses should be consistent with the evidence provided by molecular evolution. This paper discusses presuppositions which should be considered in building evolutional hypotheses consistent with molecular genetics, then presents hypotheses concerning the possible evolution of sex difference in intelligence.

Molecular-Level Evolution

Leakey (1994) summarized three hypotheses on the evolution of language proposed from the archeological, brain-anatomical, and speech-organic points of views. (a) From archeological remains it is hypothesized that language ability appeared at the early stage in the evolution of Homo, stayed at a relatively lower functional level during most of the prehistoric era, and drastically improved in more recent times. (b) From the anatomical evidence of the brain it is hypothesized that language ability evolved gradually. (c) From the point of evolution of speech organs, language ability developed at an

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

early stage in the evolution of Homo.

It is inappropriate to suggest that language evolved suddenly. At the molecular level, genetic information is carried by different types of base or nucleic-acids which are aligned on a spiral structure of DNA. Evolution at the molecular level is represented by the insertion of a new base, replacement of a base by another base, or loss of a base on the DNA. There are cases where a long chain of bases on the DNA is added, replaced, or lost at one time. Sometimes, a whole alignment of a gene is replaced.

Every cell of an organ has its own DNA, and changes of the DNA in reproduction cells produce evolution in the form of a mutation of the base alignment of the DNA. The mutation occurs with a certain probability through the long course of evolution. Every gene has its own probability of mutation, and the probability is constant. The number of mutations counted during a certain period of time is the velocity of the evolution. This principle, which has been applied to determine the rate of differentiation of species and to classify different species, is known as the Molecular Evolutional Clock (Zuckerkandl, 1987).

Phenomenal changes may be observed at a certain point of evolution, but evolution at molecular level has been taking place constantly as measured by the molecular evolutional clock. The eyes of insects are phenomenally different from human eyes, but similar genes are shared by these two organisms (Miyata, 1996). The genes of the organisms changed their bases gradually and constantly while following the molecular evolutional clock which has a constant pace. The evolution of language as influenced by a certain gene could achieve major dimensions, but there could be observably different evolution produced by the same type of gene.

The velocity of evolution differs, depending on the organism. The velocities of the evolution of the genes controlling the brain and neural system, which have complex and important functions, are significantly slower than those of the genes acting on other organs (Kuma, et al., 1995). It is quite implausible to think that the evolution of language, which is a function of the cerebral cortex, evolved very recently. Language is more likely to have evolved gradually as compared with other functions. There was no evolutional jump as presupposed by some linguists (Chomsky, 1988; Pinker, 1994). It is

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

difficult to construct an appropriate experimental design, but pursuit of the evolution of language in hominoids (Savage-Rumbaugh & Lewin, 1994) should not be stopped. From the point of molecular genetics, it is difficult to believe that the hominoids do not possess a type of gene which evolved to produce language in Homo. The most important functions of Homo's brain were prepared in the course of the evolution of hominoids. As Matano and Hirasaki have stated:

> The reorganization of the cerebellar motor system for bipedalism in human locomotion after the return to the ground may have evolved relatively easily by a little modification of this system that had evolved in arboreal life... Furthermore, this reorganization of human cerebellum could have been a prerequisite for the evolution of human language. (Matano & Hirasaki, 1997).

Gene Recruitment and Continuity in Evolution

Miyata (1996) explains gene-level evolution strategy. Suppose that a mutation occurs at one of the bases on the gene alignment which is crucial to the performance of the major function of the gene. Such a mutation would be dangerous in most cases because it might force an organism to make an inappropriate response to the environment. These kinds of dangerous mutations are excluded from the gene pool because they do not allow the organism carrying them to survive. However, without changes in the bases that are related to the major function of the gene, there would be no evolution at all. To solve this paradox, the organism follows a gene duplication strategy: it produces a copy of a certain gene. As a result, the organism possesses two sets of the gene. One of the genes continues to control its function, but the other is free from any functions. The free gene has no relation to the function. Any mutation occurring on this free gene is not dangerous for the organism, but the mutated gene can be tested for a new function. If the mutation is advantageous, the new gene will remain and the former gene will be discarded. Even if the mutation were dangerous for the survival of the organism, the organism would be able to reactivate the former gene and to survive.

Sometimes, an organism copies and borrows a gene which was successful in a different function. The gene which was proven to be successful for the different function is recruited for a new function.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The organism is able to evolve while minimizing the negative effects of mutation. This genetic strategy is known as gene recruitment (Wistow, 1993).

In the case of an evolution like language, it is implausible to think that such a major evolution which was composed of variety of functions was made by a single mutation occurred on a gene, or by mutations simultaneously occurring on multiple genes. It is more appropriate to hypothesize that the evolution of language is a result of accumulated evolutions of different functions. Homo probably used base alignment on genes which had been proven to be successful in a different function before the alignment was used for the evolution of language. Before the evolution of language, the alignment could have been tested to be successful in a function which evolved before the evolution of language. Genetic tools to evolve language could have been prepared by an evolution development which occurred prior to language evolution and could have been recruited for language evolution. In addition to the evolutional hypothesis of language, an hypothesis concerning the preceding evolution which prepared the way for the evolution of language should be presented. Similar evolutionary strategies may be used by other species at the molecular level evolution, although the direction of that evolution may be different.

Sexual Selection

Miyata (1996) explains the probabilistic difference of mutation on autosome (A), X chromosome (X), and Y chromosome (Y). There are differences of probability by combination of the chromosomes. The Y chromosome always comes from the male. The number of sperms is far larger than that of eggs, and most of mutations occur when a chromosome is being carried by sperm. The ratios of probability of mutation on the autosome, the X chromosome, and the Y chromosome are A : X : Y = 1 : 2/3 : 2 which coincide with empirical data 1 : 0.6 : 1.7. The probability of evolution originated from females is smaller than that from male.

If any evolutional hypothesis is built on female mutations, it is suggested that one should consider the possibility of the male's mutation being selected by the female's evolution. The probability of female mutation is smaller than that of male. The velocity of

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

evolution needs to be accelerated by male evolution conditioned by sexual selection on the female side. Without sexual selection, rapid evolution of Homo will not be explained. "It became possible to quickly and efficiently combine favorable sexual selections and new gene constellations for body and brain structures and functions that best subserve survival and reproduction of parents and of the next generation" (Nyborg, 1994).

Bipedality and Handedness

With bipedality, Homo acquired free hands and fingers, but had limitations at their shoulders and elbows. Shoulders and elbows, which were used for four-footed transportation, had to move alternately. Automatic and simultaneous control of both right and left shoulders and elbows was an effective strategy for transportation. Fingers and hands, which evolved later, are controlled by cross lateral hemispheres. Neural control of the shoulders and elbows, which were originally organs for transportation, was not laterally differentiated; hands and fingers were laterally differentiated from the initial evolution. In visual-reaching tasks, central parts of the cerebrum of both hemispheres are controlling shoulders and elbows, but fingers and hands are controlled cross-laterally (Sakano, 1991). The two strategies are considered to compensate the neural disadvantages of shoulders and elbows and to facilitate more speedy and accurate use of unilateral hands and fingers. One is to evolve cross-lateral control of shoulders and elbows. The other is to evolve specialized cortical control on a shoulder and an elbow at one side while sacrificing the use of the other side. Handedness could be an adjustment strategy to compensate limitation of automatically controlled shoulders and elbows for specialized cross-lateral hemispheric areas of fingers and hands. By developing handedness, Homo acquired an evolutionary strategy of unilateral use of hemisphere for a specific function. This could be the preceding condition for the evolution of language – which is processed only at left hemisphere. The handedness had been found in different primates (MacNeilage, et al., 1987). Homo could have recruited the genetic strategy of handedness from ancestral primates.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Different Hemispheric Functions

Basically each hemisphere processes signals that control functions of the opposite side of the body. Primary motor cortex at the right hemisphere controls the physical activity of the left of the body and that at the left hemisphere controls the right side of the body. Most of the centers that control motor and perceptual functions are symmetrically located at both hemispheres. However, there are areas where functions of the right and left hemispheres are different. There have been extensive researches on the differences between the right and left hemispheres (Luria, 1973; Geschwind & Galaburda, 1987). Anatomically, the right hemisphere has more white matter or long, myelinated fibers, and the left hemisphere has more gray matter or neurons and short nonmyelinated fibers (Goldberg & Costa, 1981).

At the right hemisphere, supra-marginal gyrus undertakes the comprehension of emotional and affective content of auditory stimuli. Angular gyrus also undertakes comprehension of emotional content of visual stimuli. The temporal pole is related to emotional responses such as fear and recall of emotional content in relations to music or vision objects. The orbito-frontal area is related to the suppression of emotional responses according to stimulus significance and conscious experience of emotion, and is connected to the hypothalamus by the medial forebrain bundle. There are functional relations among orbito-frontal area, cingulate gyrus, and parahippocampal gyrus (Hirasawa & Okamoto, 1982).

In the left hemisphere, supra-marginal gyrus and angular gyrus undertakes tactile sensory memory, visuokinesthetic motor engrams, visual sensory memory, auditory memory storage, and auditory sensory memory. The temporal pole and orbito-frontal area are related to short-term memory. The inferior temporal gyrus is related to visual memory. The superior temporal gyrus is related to long-term memory; the hippocampus and fornix are related to recent memory and new learning (Hirasawa & Okamoto, 1982).

Homo could have acquired a strategy to use brain areas asymmetrically. The areas asymmetrically located in the cerebral cortex are related to higher functions such as language, emotions, associations, and memories. If one function is bilaterally controlled, there should be fibers which connect two areas located at two different hemispheres. "Functions that require extensive intracortical

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

connectivity may become lateralized. The number of fibers within the corpus callosum, which provides connections between the hemispheres, is far less than the number of intracortical fibers within a hemisphere. In fact, if the corpus callosum provided a richness of connections comparable to that of the intracortical connections, it would have to be as big as the brain" (Kupferman, 1991). Lateralization is a strategy to maintain the efficiency of the brain. The evolution of higher cortical functions of the human brain could not be accomplished without the lateralization strategy.

The Mating Season and Ovulation of Chimpanzees

The non-human female primate accepts the male only at the ovulation period when she is fertile. Females are excited physically and behaviorally during this period, which is called "the mating season" (Nozaki, 1989). The sexual skin of the female chimpanzee enlarges only at the mating season, and for male chimpanzees the enlarged sexual skin is a visible sign that the female chimpanzee accepts males. The mating season of chimpanzees is composed of four periods: inflation, maximal tumescence, detumescence, and flat periods (Goodall, 1986). Copulation occurs only at maximal tumescence. The twenty days of the mating season of the pigmy chimpanzee is twice as long as the mating season of the common chimpanzee. The female pigmy chimpanzee does not always conceive as a result of copulation during the mating season. There is a separation of sexual intercourse and reproduction. Both the common chimpanzee and the pigmy chimpanzee experience adolescent sterility several years after menarche. During the period of adolescent sterility, the enlargement of the sexual skin of the common chimpanzee is small and sexual intercourse is infrequently observed. Unlike the common chimpanzee, the pigmy chimpanzee has maximal tumescence and engages in copulation during the period of adolescent sterility (Nozaki, 1989). This is another separation of sexual intercourse and reproduction.

The male chimpanzee's penis is relatively large, and its scrotum is extremely large. It weighs 0.269% of the whole body (Schults, 1938 in Goodall, 1986). For the promiscuous chimpanzee, the large scrotums are needed. Scrotum weights of the gorilla and of Homo are 0.017% and 0.079% of the whole body respectively (Short, 1979 in

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Goodall, 1986). The male Homo could have evolved relatively non-promiscuous behavior, and Homo's society became monogamous. There can be cases of extra-marital sexual relations, but the number of cases is far smaller than that of chimpanzees. The size of Homo's scrotum is smaller than that of chimpanzee and Homo lacks the sexual dimorphism as gorilla. There could be different evolutional pressure to construct monogamous societies among Homos.

The Concealed Mating Season of the Female Homo

Pigmy chimpanzees are able to walk easily over 20 meters by bipedality while holding objects in their hands (Takeuchi, 1988). The location of genital and sexual skin of the female pigmy chimpanzee have moved towards the front (Dahl, 1985). Estrus females of the pigmy chimpanzee entice males more actively than estrus females of the common chimpanzee. A male common chimpanzee approaches a female for copulation from the dorsal side. Female pigmy chimpanzees prefer to accept copulation with males from the anterior side. This may be due to the location of the genitals. "When the labium minus pudendi of female pigmy chimpanzee enlarges, the clitoris moves towards the anterior and comes out between the thighs" (Ooshima, 1987).

Female pigmy chimpanzees acquired distinctive characteristics: A longer mating season, half of which is sterile, longer adolescent sterility which is not detectable from changes of less exposed sexual skin, a sexual position in which there is facial communication, and sexually-active behavior towards males. Female pigmy chimpanzees evolved a better opportunity to develop verbal communication. The symbol-learning ability of Kanzi (Savage-Rumbaugh & Lewin, 1994), pigmy chimpanzee may not be a coincidence. A humanlike pattern of Wernicke's area was found at chimpanzee's planum temporale (Gannon, et al., 1998). The matured female Homo sends sexual signals by large buttocks and breasts (Nozaki, 1989).

Unlike Homo, monogamous female gibbons show their genital swelling to signal the mating season (Dahl & Nadler, 1992). But unlike other primates, the ovulation period of the female Homo is totally concealed from the eyes of the male (Diamond, 1992). A female Homo was able to accept a male when she wanted to have sexual intercourse regardless of her ovulation period. The female

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Homo acquired an independent behavioral strategy for selecting her partner. Bipedality prohibited the female from exhibiting her genitals to males, although males were receiving ambiguous sex signs from the female's breasts. Mature female Homo has long estrus and ambiguous signs of sexual excitement (Yamagiwa, 1989). The males were not able to know female's ovulation period while receiving ambiguous signals which only produce expectation, and as a result the female Homo captured the initiative in selecting partners from the males. But how can she send a signal when she is ready to accept a selected partner. It is suggested that the female's need to send such a signal to a male promoted the evolution of language and intelligence. Language was one of the means by which female Homo chose to effect her sexual selection.

The Peaceful Language of the Female

It is suggested that language was used by the female Homo as an evolutionary development to send signals to their partners. By bipedality, the copulation period was concealed from males and a move of the genitals to the anterior side produced face to face association in copulation. The females developed a method of sending signals that they were ready to accept selected males for copulation. Unlike chimpanzees, whose signal of mating season is enlargement of sexual skin visible to any males, the female Homo gained the ability to send signals exclusively to their preferred males by use of language. The face to face association during copulation triggered a development of personal affection, and symbols for sex and love were concentrated at anterior side of body (Ooshima, 1987).

Sex hormones are related to sex behaviors during ovulation. The sexual behavior of lower level mammals disappears soon after castration, but the behavior can be recovered after dosage with sex hormones: androgen for male and estrogen for female. In the case of human, hominoid, baboon, and other higher primates, control by hormones over sexual behavior is less strong. Once the cortex came to control the secretion of hormones, humans could extricate themselves from the control of hormones. Apes are under the control of sex hormones, and copulation is allowed only during the mating season. Humans were released from direct hormonal control, and became able to perform sex at other times: mankind lost the mating

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

season (Ooshima, 1987), and became able to mate all the year round.

"The brains of the two sexes may differ in their patterns of cerebral asymmetry" (Kelly, 1991). There is sexual dimorphism in the human brain according to Breedlove (1994). Language processing of females is performed bilaterally in contrast to male language processing which is performed unilaterally (Lynn, 1998). The right hemisphere performs comprehension of emotional and affective content of auditory stimuli, comprehension of emotional content of visual stimuli, emotional responses such as fear and recall of emotional content in relations to music or vision, suppression of emotional responses according to stimulus significance, and conscious experience of emotion. The language of females is linked to the emotions through the corpus callosum of which the posterior portion is larger. Females further evolved language as a means to indicate that they were ready to accept copulation, and it is notable that female language ability is more closely related to emotions and to emotional skills which will enable them to attract a partner. Females emancipated themselves from the control of hormones and evolved the ability to select their partners according to their preferences. This hypothesis explains the males/female sex differences in language.

For the females who evolved language to send signs to males, beautiful and attractive sounds were important. The range of sound should be effective enough to drive away or discourage unfavorable males. A higher pitch was appropriate for this kind of communication. Initially language was not a tool for logical communication but a tool to communicate desires and emotions. The evolution of speech organs which evolved at the earlier stage of the evolution of Homo prepared the way to the further evolution of more logical language which appeared later. The first human language was a love song rather than a howl of warning (Money, 1997).

Neoteny of Homo Infants

As we have noted, Homo evolved bipedality, but this had to be done by sacrificing any easy enlargement of parturient canal. Better adjustment of the lower extremities and the body to bipedality also enabled the Homo to support larger skull and brain. The enlarged skull and brain created a problem, however, for the neonate to pass through parturient canal at delivery. To have easier delivery, a larger

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

parturient canal was desirable, but if it was enlarged adequately for the needs of the larger skull and brain, bipedality could become difficult. With a larger pelvis, it is more difficult to move rapidly if dependent on bipedality. Homo neonate rotate their skulls 90 degrees to pass through the narrow parturient canal: the birth of a Homo neonate is not easy.

Homo consequently adopted a strategy of premature delivery of neonates. The brain volume of hominoid neonates is one half that of the adult hominoid; the brain volume of Homo neonates is less than one third of that of the adult Homo (Leakey, 1994). This ratio is observed already in *Homo erectus* (Walker & Leakey, 1993). As a result of premature delivery, Homo infants had to be nursed for a longer period as compared with other Hominoids. During this period of time the cerebral cortex of Homo infants continues to develop. Physically and neurologically, immature Homo infants had to be taken care of by adults during this period. At the point of birth, the brain of human neonate is still maintaining the same speed of growth as that of the fetus. If the growth were continued in the womb, the skull would become too large soon and the neonate would not be delivered safely (Gould, 1977).

Homo females faced another evolutional pressure. Food acquisition activities of the females could be restricted by pregnancy and by the young infants who needed care. The burden of the last stage pregnancy in transporting the fetus in bipedal Homo females would be larger than for the females of quadruped hominoids. Homo is delivered prematurely and lives the first year as an ectopic fetus (Portmann, 1941 in Gould, 1977). The females had to spend more time and effort caring for these prematurely delivered neonates. The females and their neonates, through lactation, had to depend more on food provided by the males. Signs transmitted to males had to be more attractive so that females would be able to secure their food from faithful providers. After delactation, infants needed food-providers. Females had to supplement the appeal of their infants by sending "love" signs to the males. Size of human fetus becomes larger than any hominoid fetus, but the bones of Homo at birth are less matured than those of any other hominoid. Epiphyses of long bone and bones of digits of hands are still cartilaginous, and occification center of carpus is not formed (Gould, 1977). There is no way for

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

very young human infants to obtain food by themselves.

It is suggested that females applied language skills to express affection to the children and later to control the behavior of premature infants in dangerous environments. Males, who were raised in a linguistic environment arranged by the females, came to understand female signs better. Language used to control infants behavior begun to improve in logical structure until it became a major means of communication in Homo society.

Social Structures and Brain Evolution

The volume of the brain and neocortex correlate with the size of the troop among primates. A large troop with a larger number of females has a large brain and neocortex (Sawaguchi, 1996). Polygamous chimpanzees have a larger brain and neocortex than monogamous gibbons. Polygamous monkeys recognize other individuals and have complex social relations. In other words, they have the intelligence to perform appropriate behavior based on the recognition of other individuals and of social relationships. Hierarchy, conciliatory behavior, expulsion, and other social relations related to polygamous societies exerted evolutionary pressure on the neocortex to expand. However, there are at least two types of polygamous primate society.

The height of male the Australopithecus was 150 cm or over, and that of female was barely 120 cm. The male's weight could be twice as large as the female's. A similar difference is observed among baboons living in the savanna. The society of Australopithecus may have been similar to that of present day baboons, where strong males fought for mature females (Leakey, 1994). The mature male baboon leaves the troop in which he was raised, and joins other troop to which he has no blood relation. He watches for an opportunity to acquire a mature female in the new troop. All the other males are competitors.

The behavior of chimpanzees is different. There are female immigrants and visitors from other troops (Goodall, 1986). Male chimpanzees stay in the same troop with males with whom they have blood relations. The males cooperate in defending their troop and territory, and in hunting. The male chimpanzee is only 15 to 20% larger than the female, and male-female difference of Homo is about

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

the same (Leakey, 1994). There are two types in polygamous society: one like the baboon and the other like the chimpanzee. Homo society is predominantly monogamous, and there could be a different evolutional pressure on male Homo.

The Male Homo's Food Acquisition Activities

After the hypothesis that females evolved language, a question comes out about roles of males. Commonsense accepts the view that the males hunted animals. "Homo abandoned traditional life style in which male and female travel together, and established a new life style in which males go out for hunting and females stay at home and around" (Takeuchi, 1988). However, it must be asked when did the male Homo began their hunting activities. Homo as a hunter is observed in a quite recent history (Shackley, 1985). Binford (1985) estimated systematic hunting started 45,000 to 35,000 years ago. It is not possible to explain the evolution by traditional hunter-gatherer hypothesis. Homo's bipedal transport ability was very limited at the early stage of evolution of Homo (Aiello, 1990). Homo might be able to catch insects and smaller animals but not be able to hunt fast-moving four-footed animals.

Shape and production methods of stone implements do not support the hypothesis of early hunting activities. Marks on flakes revealed that the hammer stone of Olduvai Bed, which was produced 1,800,000 years ago by *Homo habilis*, was grabbed by a hand and brought down vertically against a hard object (Takeoka, 1989). It is difficult to hunt one animal in a large troop even for a fast-running carnivorous animal. Attacking fast-moving animals by early Homo's primitive stone implements with blunt edges could be very dangerous. Primitive stone implements could be appropriate for cutting meat and crushing bones, but not appropriate for use as a tool to attack such animals. It is estimated from scratches on bones excavated from Homo's camp sites that Homo could have eaten the remains left over from the kills of other carnivorous animals (Shackley, 1985). At the initial stage of stone implement, the mass of stone was important. The mass of the stone was effective in crushing bones from which Homos ate bone marrow. For a cunning scavenger who wanted to drive away other animals, fast and accurately-thrown natural stones were effective armaments. The stone mass may not fatally damage to

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

the animals but were good advantage against quadruped animals.

The Spatial Ability of the Male Homo

Mace, et al. (1980) discussed that foraging activities related to food habits could be promoters of brain evolution, and suggested a foraging-strategy hypothesis. Fruits are produced at a certain season in a three-dimensional space. Food patches are dispersed within wide area. Chimpanzees are aware of production seasons of different fruits. They even abandon edible foods and move to different food patches where they can eat more delicious ripe fruits (Goodall, 1986). To search and feed fruits, higher intellectual skills, i.e. memorizing the location of fruit tree and season of fruit production, searching fruits in a three dimensional space, approaching the fruits by travelling along branches were necessary. Fruit-feeding primates have larger brains than leaf-feeding primates. The baboon's neocortex is the most highly-developed among anthropoids (Sawaguchi, 1996). The ratio of diverse animals, insects and small vertebrate animals within food contents positively correlate with the size of the neocortex (Sawaguchi, 1996). It is estimated that fruit-feeding habits and hunting-habits both contributed to the evolution of the brain.

Herbivorous animals migrate in search of grasses and plants. Regardless of styles for food acquisition: either scavenging or hunting, Homos had to go to the areas through which the herbivorous animals pass at an appropriate season. They had to have a "map" in brain and the necessary spatial ability to travel and return to their camp. Homo's map for food acquisition was more complex as compared with the map used by fruit eating apes. Gross migration routes could be the same, but exact pathways could be changed due to the threat of attacking carnivorous animals, the location of water patches, and growth of grasses. The timing of the passing of herbivorous troops might vary every year. Much higher intelligence is needed to scavenge or to hunt at such mobile food patches as compared with the intelligence needed to catch small animals and insects.

Development and Maturation beyond Genes

Bipedality increased the brain volume of Homo and changed copulation behavior, thereby stimulating the evolution of language. The increased brain volume, especially of the cerebral cortical,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

interplayed with language which needed larger cortical areas. Homo begun to deliver neonates as neoteny as brain volume increased over the size of parturient canal. The infant Homo was thrown out of its warm womb as neoteny, but acquired a strategy to cope with this harsh environment.

During the evolution from amphibia to reptiles, the amount of information contained within the brain, estimated from number of synapse inputting into neural cells, reached 10^9. This amount of information is equivalent to the amount of information carried by DNA, which in humans is only 10^{10}. But the amount of information contained in the human brain reached 10^{13}. Beyond the reptilian evolutionary stage, the amount of information in the brain far exceeds the amount of information carried by DNA (Tsukahara, 1987). With evolution, the amount of information processed in the brain increases, but the increase of genetic information of mammals has barely increased. There is not much difference of genetic information carried by DNA of a rat, cat, dog, and human. The information carried by the DNA may be enough to construct framework of brain, but the functional activities are limited by the DNA (Britten & Davidson, 1969).

One of the most important characteristics of the human brain is the large amount of information acquired and adopted through the process of development and maturation as compared to the information transmitted by the genes. The brain learns from environments and composes its own structure. This learning is observed as over-production of neural cells and elimination of neural cells. The neural cells of a mammal, multiply, divide and move to their own positions in the cortical layer during the embryonic period to mid-fetus period. It was found that the number of neural cells of the fetus is much larger than the number of neural cells of the matured brain (Tsumoto, 1986). Learning was carried out by language. The Homo who was ejected from the warm womb was given a new cradle – language.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

References

Aiello, L. (1990).
Patterns of stature and weight in human evolution, *American Journal of Physical Anthropology*, 81, 186-187.

Binford, L. (1981). Bones: Ancient Men and Modern Myth, London, Academic Press.

Breedlove, S.M. (1994). Sexual Differentiation of the Human Nervous System. *Annual Review of Psychology*, 45, 389-418.

Britten, R.J. & Davidson, E.H. (1969). Gene regulation for higher cells: a Theory, *Science,* 165(891): 349-57.

Chomsky, N. (1988). Language and Problems of Knowledge, Cambridge, MIT Press.

Dahl, J.F. (1985). The external genitalia of female pygmy chimpanzees. *Anatomical Record*, 211(1): 24-8.

Dahl, J.F. & Nadler, R.D. (1992). Genital Swelling in Females of the Monogamous Gibbon, Hylobates (H.) lar, *American Journal of Physical Anthropology,* 89: 101-108.

Diamond, J. (1992). The Third Chimpanzee, New York, Harper Publishers.

Gannon, P.J.; Holloway, R.L.; Broadfield, D.C.; & Braun, A.R. (1998). Asymmetry of chimpanzee planum temporale: humanlike pattern of Wernicke's brain language area homolog. *Science,* 279(5348): 220-2.

Geschwind, N., & Galaburda, A. (1987). Cerebral lateralization: biological mechanisms, associations, and pathology, Cambridge, MA: MIT Press.

Goldberg, E. & Costa, L.D. (1981). Hemisphere differences in the acquisition and use of descriptive systems. *Brain Lang,* 14(1): 144-73.

Goodall, J. (1986). The Chimpanzees of Gombe / Patterns of Behavior, Harvard University Press.

Gould, S.J. (1977). Ontogeny and Phylogeny, Boston, Harvard University Press.

Halpern, D. (1996). Public Policy Implication of Sex Difference in Cognitive Abilities, *Psychology, Public Policy, and Law,* 2 (3/4), 561-574.

Halpern, D. (1997). Sex Difference in Intelligence, Implications for Education, *American Psychologist*, 52(10), 1091-1102.

Hirasawa, K. & Okamoto, M. (1982). Anatomy, Vol. 2, Angiologia & Systema nervosum, 11th Ed., Tokyo, Kinpara shuppan. (Text in Japanese.)

Kandel, E.R. (Ed.). (1991). Principles of Neural Science, 3rd. Ed. Norwalk, CT, Appleton & Lange.

Kupfermann, I. (1991). "Localization of Higher Cognitive and Affective Functions: The Association Cortices" in Kandel, E.R., Schwartz, J.H., & Jessell, T.M. (Eds.) Principles of Neural Sciences (3rd. Ed.), East Norwalk,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

CT, Appleton & Lange.
Kelly, D.D. (1991). Sexual Differentiation of the Nervous System, in Kandel, E.R., Schwarts, J.H., & Jessell, T.M. Principles of Neural Science, 3rd. Ed. Norwalk, CT, Appleton & Lange.
Kimura, D. (1987). Are Men's and Women's Brains Really Different? *Canadian Psychology / Psychologie Canadienne,* 28(2): 133-147.
Kubota, K. (ed.) (1991). Origins of laterality and brain, Tokyo, Asakura shoten. (Text in Japanese.)
Kuma, K.; Iwabe, N.; Miyata, T. (1995). Functional Constraints against Variations on Molecules from the Tissue Level: Slowly Evolving Brain-Specific Genes Demonstrated by Protein Kinase and Immunoglobulin Supergene Families, *Molecular Biology and Evolution*, 12(1): 123-130.
Leakey, R. (1994). The Origin of Humankind, New York, Basic Books.
Luria, A.R. (1973). The working brain: An introduction to neuropsychology, New York, Basic Books.
Lynn, R. (1996). Differences between males and females in mean IQ and university examination performance in Ireland. *Personality and Individual Differences,* 20(5): 649-652.
Lynn, R. (1998). Sex Differences in Intelligence and Brain Size: A Developmental Theory. (Unpublished manuscript.)
MacNeilage, P.F., Studdert-Kennedy, M.G., & Lidblom, B. (1987). Primate handedness reconsidered, *Behavioral & Brain Sciences,* 10: 247-303.
Mace, G., Harvey, P.H., & Clutton-Brook, T.H. (1980). Is brain size an ecological variable? Trends in Neuroschience, 3: 193-196.
Matano, S. & Hirasaki, E. (1997). Volumetric Comparisons in the Cerebellar Complex of Anthropoids, with Special reference to Locomotor Types, *American Journal of Physical Anthropology,* 103: 173-183.
Miyata, T. (1996). Evolution of biological substance which eyes tell, Tokyo, Iwanami shoten. (Text in Japanese)
Money, J. (1997). Evolutional sexology: the hypothesis of song and sex, *Med. Hypotheses,* 48(5): 399-402.
Nozaki, M. (1989). Sex and reproduction of Monkeys, mechanizm to entice sex behaviors, in Ebara, A. (Ed.). How much monkeys do resemble mankind? Tokyo, Shogakukan. (Text in Japanese)
Nyborg, H. (1994). The Neuropsychology of Sex-Related Differences in Brain and Specific Abilities, Hormones, Developmental Dynamics, and New Paradigm, in Vernon, P.A. The Neuropsychology of Individual Differences, London, Academic Press.
Ooshima, K. (1987). Female's brain vs. Male's brain: The surprising sex differences which Cerebrophysiology explicated. Tokyo, Shodensha. (Text in Japanese)
Pinker, S. (1994). The Language Instinct, How the Mind creasts Language, New York, William Morrow & Co.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Portmann, A. (1941). Die Tragzeiten der Primaten und die Dauer der Schwangerschaft beim Menschen: ein Problem der vergleichen Biologie. Rev. *Suisse Zool,* 48: 511-518.

Reiss, A.L., Abrams, M.T., Singer, H.S., Ross, J.L., & Denckla, M.B. (1996). Brain Development, Gender and IQ in Children A volumetric imaging study. *Brain* 119: 1763-1774.

Rushton, J.P. (1992). Cranial capacity related to sex, rank, and race in a stratified random sample of 6,325 military personnel, *Intelligence*, 16, 401-413.

Sakano, N. (1991). Development of Latent Handedness. in Kubota, K. (ed.) Origins of Laterality and the Brain, Tokyo, Asakura Shoboh. (Text in Japanese)

Sanders, G. (1998). Beyond Sex Differences in Functional Cerebral Asymmetry and Cognitive Abilities, Proceedings of 24th Annual Meeting of International Academy of Sex Research, Sirmione, Italy, Jun 3-6.

Sanders, G. & Wright, M. (1997). Sexual Orientation Differences in Cerebral Asymmetry and in the Performance of Sexually Dimorphic Cognitive and Motor Tasks, *Archives of Sexual Behavior,* 26(5): 463-480.

Savage-Rumbaugh, S. & Lewin, R. (1994). Kanzi : The Ape at the Brink of the Human Mind, John Wiley & Sons.

Samaguchi, Sawaguchi, T. (1996). Brain Evolution, Tokyo, Nihon-Hyoronsha, Ltd. (Text in Japanese)

Schults, A.H. (1938). The relative weight of the testes in primates, *Anat. Rec.,* 72:387-394. (Quoted in Goodall, 1986.)

Shackley, M. (1985). Using Environmental Archaeology, B.T. Batsford, Ltd.

Shaywitz, B.A., Shaywitz, S.E., Pugh, K.R., Constable, T.D., Bronen, R.A., Fletcher, J.M., Shankweiler, D.P., Katz, L., & Gorse, J.C. (1995). Sex differences in the functional organization of the brain for language, *Nature*, 373(16), 607-609.

Short, R.V. (1979). Sexual selection and its component parts, somatic and genital selection, as illustrated by man and the great apes. *Advanced Study of Behavior,* 9: 131-158.

Takeoka, T. (1989). Research Methods of Stone Implement, Tokyo, Gensohsha. (Text in Japanese)

Takeuchi, K. (1988). Human Evolution by Extramarital Copulation, Tokyo, Shobunsha. (Text in Japanese)

Tsukahara, N. (1987). Plasticity of Brain and Memory. Tokyo, Kinokuniya-shoten. (Text in Japanese)

Tsumoto, T. (1986). Brain and Development, Environments and Plasticity Tokyo, Asakura-shoten. (Text in Japanese)

Walker, A. & Leakey, E. (1993). The Nariokotome Homo Erectus Skeleton, Cambridge, Harvard University Press.

Wistow, G. (1993). Lens crystallins: gene recruitment and evolutionary dynamism, *Trends in Biochemical Sciences*, 18(8), 301-306.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Yamagiwa, J. (1989). Towards the Theory of Origins of Family, in Ebara, A. (Ed.) How much do monkeys resemble mankind? Tokyo, Shogakukan. (Text in Japanese)

Zuckerkandl, E. (1987). On the molecular evolutional clock, *Journal of Molecular Evolution*, 26(1-2): 34-46.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

A Giant from Ostrów Lednicki (XII-XIII c), Dist. Lednogóra, Poland

J. J. Gladykowska-Rzeczycka
Department of Anatomy and Anthropology, Academy of Physical Education, Gdañsk
A. Śmiszkiewicz-Skwarska
Department of Anthropology, University of Lódz
A. Sokól
Department of Radiology, Medical Academy of Gdañsk

Gigantism is a serious condition, manifesting itself not only in excessive body height, but also in disturbances within other systems [e.g. respiratory, nervous and vascular system (Hayles 1980)] since it is caused by excessive secretion of the pituitary hormone somatotrophin, most frequently in connection with an acidophil adenoma developed in childhood. A skeleton, likely female, excavated from an early medieval cemetery of Ostrów Lednicki in Lednogóra, dated between the end of 11th and the beginning of the 14th century A.D., is presented. The length of the skeleton *in situ* was 208 cm, and after Trotter, Gleser's - 215,5 cm. Morphological, radiological and TC investigations show that the bones are massive, particularly the skull. Lesions are apparent in many bones, especially in the skull and vertebrae. These are lesions characteristic of gigantism: acromegaly, osteoma, inflammatory process, fracture, degenerative deformations, extensive loading and some developmental deviations. Apart from a thorough description and measurements of the case, a short outline of hitherto described cases of gigantism is presented.

Key words: Gigantism, Middle-Ages, Poland, Morphology, Somatotrophia.

Gigantism manifests itself in excessive growth, particularly of long bones, caused by hypersecretion of the pituitary hormone somatotrophin, most frequently in connection with an acidophil adenoma developed in childhood. Apart from gigantism and acromegaly, accelerated undue body growth in childhood is also caused by other disturbances, as e.g. adrenogenital syndrome, adrenal or testicular tumors as well as Marfanjs syndrome (Keith 1911,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Johnston 1993).

The term „giant" refers to people whose stature considerably exceeds the parameters of their environment. It is very difficult to establish which value of body height defines a given person as a giant, since the average body height of different nations shows great variability (Antoniewicz 1906, Hayles 1980).

Giants may be slender or thickset; but they are always proportionally built. Giants who grow very rapidly, usually die at a young age (Antoniewicz 1900). The reason for their early death is ordinarily cachexia, progressive neuropathy connected with muscular weakness, bony changes which lead to major deformities and loss of moving ability, and infectious diseases, most frequently tuberculosis (Hutchinson 1900). Radiologically, vast paranasal spaces and mastoid cells, strongly enlarged sella turcica and an undue amount of active pituitary tissue are observed (Humbert 1937).

It appears from the literature that the discussion about excessive body height was quite heated at the turn of the 19th-20th centuries, e.g. Hutchinson 1900, Antoniewicz 1906, Talko-Hryncewicz 19211, Fuschs 1935, Humbert 1936, 1937, Bergland 1965, Dokladal 1968, 1969, London 1968, Sandison, Wells 1967. "The first mention in the medical literature of gigantism possibly acromegalic, did not appear till 1567. In his History (7, 117) Herodotus described a man Artachaees of the Achmaenid family, who was about 8 feet 2 inches in height and had the loudest voice in the world; also in Book 9: 83 he mentions among the Persian dead at Plataea the skeleton of a man 7,5 feet tall (5 cubits)" (Sandison, Wells 1997). In 1916, Larger put forward a hypothesis of racial gigantism, which was supported by Mahoudeau (1916). Todd (1914) considered „legendary giants of Hebrew mythology and examined the factual basis of the belief" (Sandison and Wells 1967). The latter write that: „Some Bible scholars.... also suggested that Samson and Goliath were perhaps pituitary giants".

Keith (1931) claimed that an acromegalic skull found at the 12th century cemetery in Gardar, south of Greenland, belonged to primitive man and was „produced by normal..... action" (citation after Sandison, Wells 1967). He saw here an analogy to the skulls of Neanderthal and man from Rhodesia. But Sandison and Wells con-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Tab. 1. Some giants of recent times.

Giants	Sex	Age Year	Body height [cm]	Body mass [kg]	Pathology	Source
Charles Byrne (the Irish giant)	M	22 1761-1783	231	-	pituitary adenoma, progressive weakness headaches, tuberculosis, alcoholism	McAlister 1974, Landolt, Zachmann 1980, Hayles 1980
Jozef Drásal (the Moravian giant)	M	44 1841-1885	243	186	pituary adenoma	Dokladal 1968, 1969
Tomas Hasler (the Tegernsee giant)	M	25 ±1876	253	155	pituitary adenoma, fibrous dysplasia, pathologic fractures	Nerlich et. al. 1994, Pirsig et. al. 1994, Vogl et. al. 1994
John Turner	M	36	±221	-	-	Humberd 1936, Hayles 1980
Persian from Bershire	M	19	220	± 200	suffered from an unrecognized shrinking disease	Fuchs 1935, Hayles 1980
Gallatin giant	M	28	±259	-	headaches, progressive weakness, joint deformities, „bedridden man"	Hayles 1980
Giant from Kentucky (the Mütter American Giant)	M	± 22 +1877	229	-	physical unfitness, non-fused epiphyses, fragile bones, scoliosis	Hayles 1980
Winkelmeier giant	M	?	226	-	-	Hayles 1980
Giants: Marianna Wehde Ella Eving	K K	? ?	229 229	- -	- -	Hayles 1980
Robert Pershing Wadlow (the Giant from Alton, Illinois)	M	22 *1918	272	211	excessive enlargement of paranasad spaces, features of acromegaly, anemia, deformities, progressive weakness, cellulitis, cahexia, fractures, abscess, sepsis	Humbert 1937, Hayles 1980
Daniel Cajanus (the Scandinavian giant)	M	46 1703-1749	221 (247)	-	-	Hayles 1980, Marketta Tamminen 1976,
Teodor Machov (the Russian giant)	M	?	238 (?)	-	-	Luschan (after Antoniewicz 1900)
Lombard (Hugo) giant	M	?	213	-	-	Hayles 1980
Bernard Coyne (the giant from Oto, Iowa)	M	24 1897-1921	234	-	„giant of infantilism type"	Humbert 1937

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Tab. 2. Some presumptive giants from antiquity and the Middle-Ages.

Presumptive giants	Sex	Chronology	Stature	Long bones	Pathology	Source (literature)
Samson, Goliath	M	?	?	-	?	Sandison, Wells 1967
Ancient Egypt	?	?	?	-	acromegaly	Brothwell 1963
Artachaees of the Achmaenid family	M	?	249		?	Sandison, Wells 1967
Persian	M	?	229		?	Sandison, Wells 1967
Skeleton from a Neolithic cemetery	?	Neolithic	?		acromegaly	Schlaginhauffen 1925, Sandison, Wells 1967
Egyptian reliefs	?	?	?			Ruffer 1911, Sandison, Wells 1967
Skeletons from Meris	?	Ptolemaic c.		Femur nat: 1) 532 2) 523		Sandison, Wells 1967
Skeleton from Burgh Castle, Suffolk	?	650 A.D.		574 575		Wells 1964
Skeleton	?	Romano-British		?		Wells 1963
Maximinus I, Roman Emperor	?	235-238 A.D.				Wells 1964, Ljunggren 1984
Skull from the paracathedral Gardar cemetery in South Greenland	?	XII c.			acromegaly (?)	Keith 1931, Sandison, Wells 1967
Pharaoh Akhenaten	M				pituitary adenoma	Aldred, Sandison 1967
Ostrów Lednicki Poland	F	XII-XIII c.	208,5		pituitary adenoma, fractures, enlarged, paranasal spaces, ossifications of the left part of skull basis (osteoma)	Gładykowska-Rzeczycka, Wrzesińska, Sokół 1998

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Tab. 3. Body height as determined by seven scientists.

Hight in cm	Author
218,8	Toldt
214,9	Manouvirier
227,0	Rollet
186,14	Pearson
144,02	Telkka
215,5	Trotter, Gleser
203,2	Fully, Pineau
average 208,5	

Tab. 4. Measurements of the skull.

Variable No. after Martin	Value of examined skeleton	Average value of female	Over the average value of female	Average value of male	Over the average value of male
g-op (1)	209	177	18,07 %	186	12,36 %
eu-eu (8)	144	136	5,88 %	140	2,85 %
ft-ft (9)	100	94,5	5,82 %	97,4	2,66 %
ba-b (17)	145	129,5	11,96 %	136,2	6,46 %
ek-ek (44)	111	95,3	14,14 %	98,8	12,34 %
zy-zy (45)	152	125,4	21,21 %	133,1	14,19 %
n-gn (47)	140	108,3	29,27 %	113,8	23,02 %
n-pr (48)	85	61,9	37,31 %	65,9	28,98 %
mf-mf (50)	25	21,8	14,67 %	22,2	12,61 %
mf-ek (51)	43	40,0	7,50 %	41,6	3,36 %
wysokość oczodołu (52)	36	32,2	11,80 %	32,4	11,11 %
n-ns (55)	57	47,4	20,25 %	50,3	13,32 %
go-go (66)	111	94,7	17,21 %	104,0	6,73 %
gn-id (69	39	28,1	38,79 %	31,2	25,00 %

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Tab. 5. Measurements of the long bones.

Variable No. after Martin	Value of examined skeleton		Average value of examined skeleton	Average value of female	Over the average value of female	Average value of male	Over average value of male
	right	left					
lenght of clavicula (1)	202	203 ?	202,5	135,5	49,44 %	142,3	42,30 %
lenght of humerus (1)	416	416	416	306,3	35,81 %	328,7	26,55 %
lenght of radius (1)	-	328	328	226,6	44,74 %	247,5	32,52 %
lenght of ulna (1)	364	361	362,45	247,5	46,46 %	268,6	34,95 %
lenght of femur (2)	555	548	551,5	416,1	32,54 %	449,5	22,69 %
width of the shaft (7)	33	33	33	25,9	27,41 %	26,3	25,47 %
lenght of the tibia (1a)	485	487	486	342,7	41,81 %	367,0	32,42 %
lenght of the fibula (1)	478	-	478	334,6	42,85 %	357,0	33,89 %

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

sidered that „it is almost certainly a descendant of the early Norse settlers of Greenland, a people in whom there is some evidence to suggest widespread pituitary dysfunction, including gigantism". „The Gardar skull may be an extreme example of this stock (with features of gigantism) but similar, less pronounced, specimens have been recovered in the same cemetery" (Perkins, 1931).

The number of modern giants is difficult to establish. Not all descriptions are reliable. Some cases are listed in Table 1.

Paleopathology

In 1981 Brothwell wrote: "Little need be said of this disorder, for the length of the body, or long-bones, should make the abnormality quite evident. Moreover, probably owing to its great rarity, no case has yet been found in earlier man. Massiveness of bone, as seen in the Pleistocene hominid fossils *Meganthropus* and *Paranthropus robustus* is not of course evidence of disturbed glandular function, but of genetically determined size-adaptation".

Hitherto described cases, known from the literature, are presented in Table 2.

The Giant from Ostrów Lednicki

The skeleton (23/77) was excavated in a 11th-14th century cemetery, in a grave dating around the 12th-13th century, into which it had been put carelessly (Fig. 1). The first description was given in 1977 (Szymczak et al.). The giant's age at death was established as between 25 and 30. The majority of features were female-like in character. Body height was calculated by seven authors, Table 3, and the average calculation of 208.5 cm was accepted. It seems, however, that the result was obtained using the Trotter, Gleser method, 215.5 cm., is closer to reality. Some measurements are presented in Tables 4 and 5.

Observed changes are based on morphological, radiological and TC investigation. The best visible changes are: enlarged dimensions of all bones of the skeleton (Table 4, 5, Fig. 2-26), and disproportionately large mandibles (Fig. 3 and 4) with a fan-shaped position of the anterior teeth (Fig. 5). This is characteristic for gigantism. The bones of the skull are strongly thickened bones, particularly in the anterior part (Fig. 6a and 6b). The left external

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

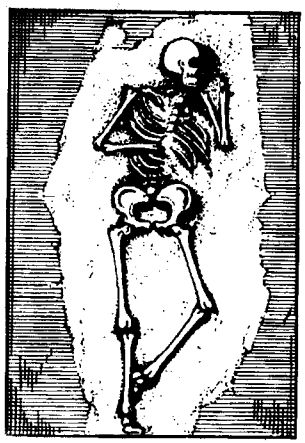


Figure 1: Careless position of the skeleton in the grave.

Figure 2: Skeleton of the giant, scoliosis visible.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

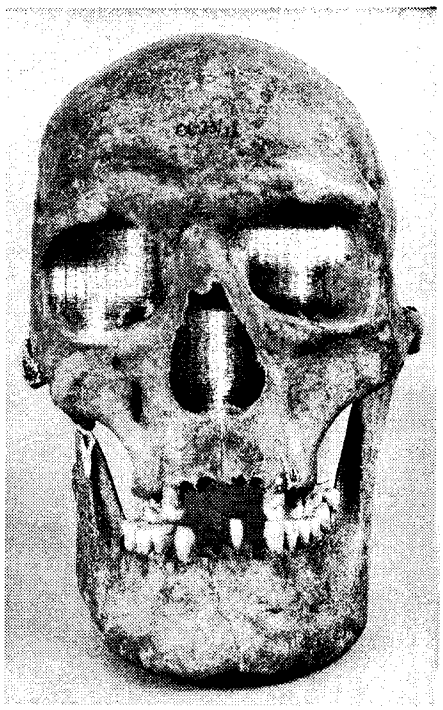


Figure 3: Skull - norma frontalis. Disproportionately large mandible.

Figure 4: Skull - norma lateralis. Large mandible, progenia strongly marked.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Figure 5: Mandible, X-ray. Note the fan-shaped position of the anterior teeth.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

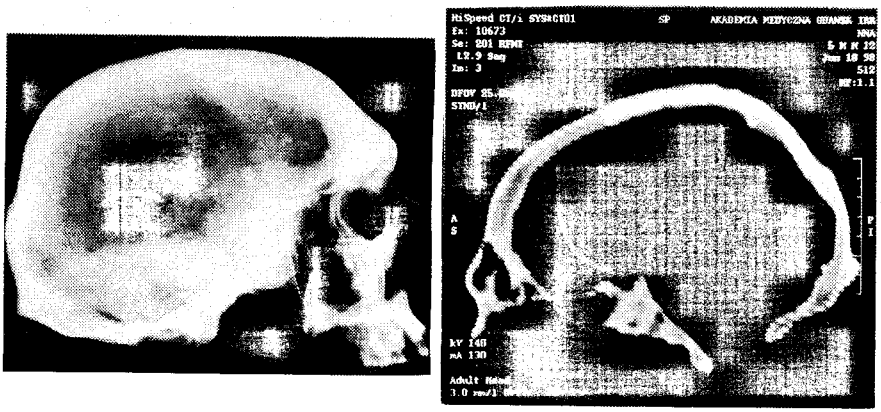


Figure 6: Skull - norma lateralis. a) X-ray - thick bones of the vault and vast maxillary sinuses. b) Sagittal tomogram: thick bones of the vault, vast frontal sinuses, flattened sella turcica, sclerotic remodeling of the sphenoid sinues.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Figure 7: Skull. a) Obliterated left porous acusticus. b) Frontal tomogram of the temporal bones - obliterated left external auditory meatus.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Figure 8: Skull - norma basilaris. Stenosed foramen and small fossa of the jugular vein.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

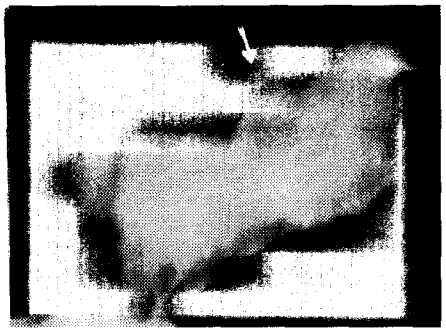


Figure 10: Tomogram of the sella turica. Enlargement of size - extension of the inlet plane, dorsum sellae is deflected posteriorly, clinoid processes are destroyed.

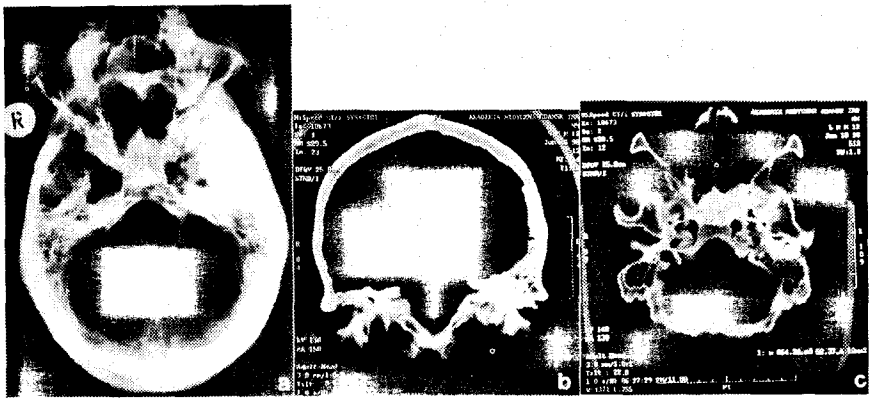


Figure 9: Skull - norma basilaris. a) X-ray - extensive sclerotisation of the left temporal bone, partial ossification of the left lateral part of occipital bone and sclerotic remodeling of the body and sinuses of the sphenoid bone. b) Frontal tomogram - extensive sclerotisation of the left temporal bone. c) Transversal tomogram. Osteoma (density 864 u. H.) fills the left external and middle ear; right mastoid cells are vast.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

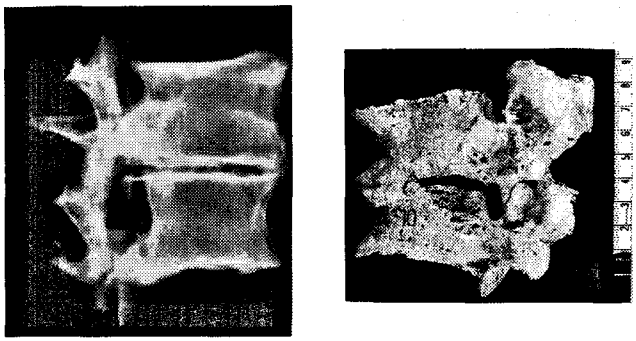


Figure 11: Thoracic vertebrae. a) Partial fusion of Th_{11-12}. b) X-ray of Th_{11-12}.

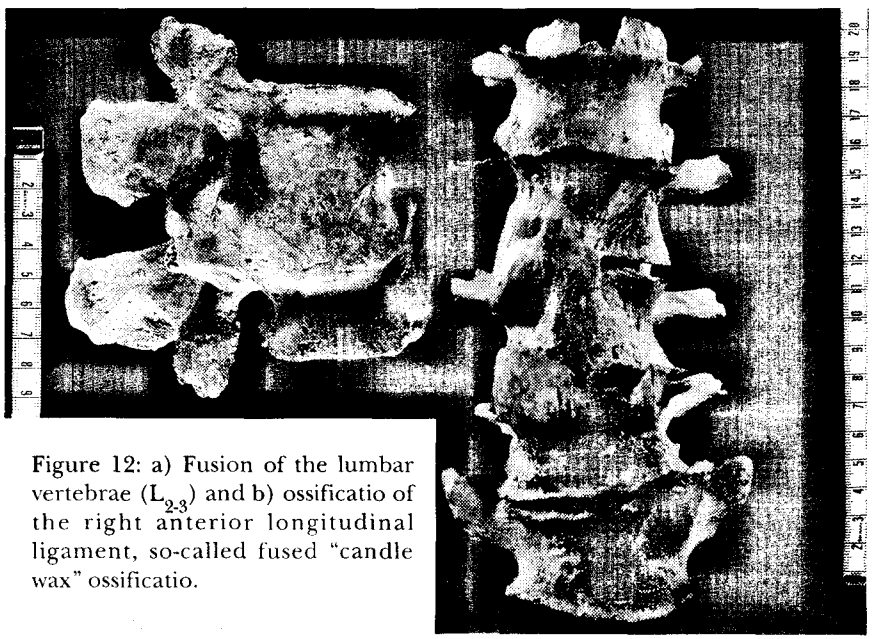
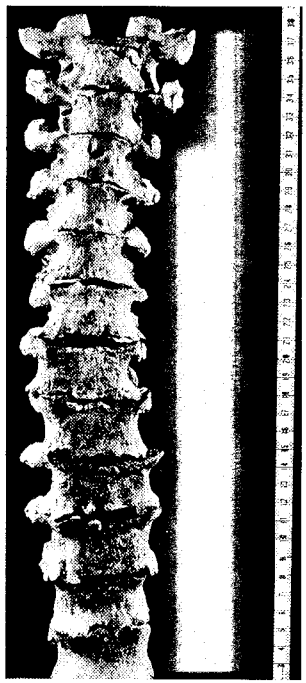


Figure 12: a) Fusion of the lumbar vertebrae (L_{2-3}) and b) ossificatio of the right anterior longitudinal ligament, so-called fused "candle wax" ossificatio.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



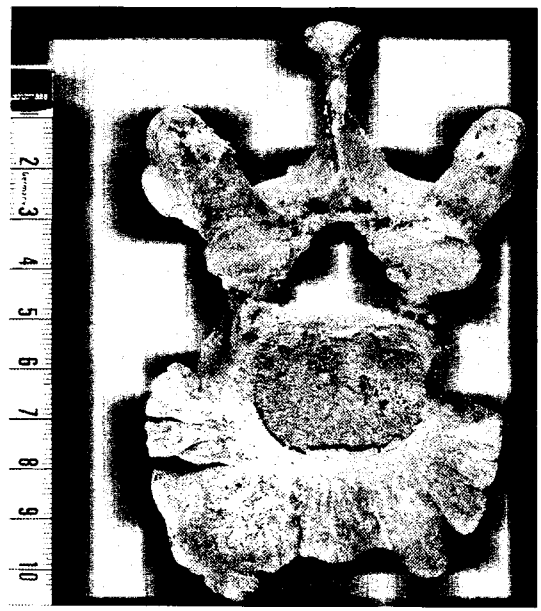


Figure 13: a, b. Exostoses of some vertebrae.

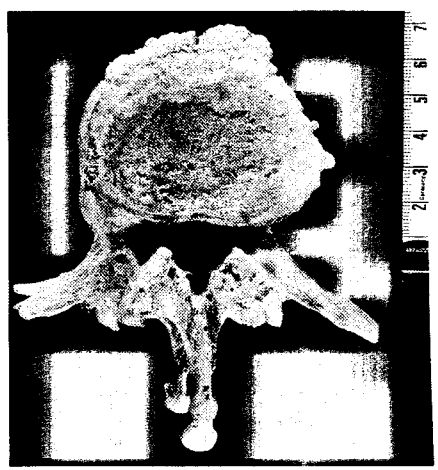


Figure 14: Lumbar vertebrae with traces of chondropathy.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Figure 15: Sacral bone. Auricular facets deformed.

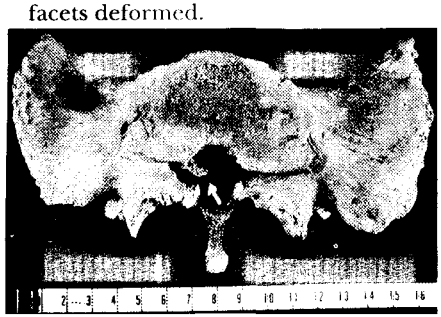


Figure 16 : Sacral bone. Exostosis in the sacral canal.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

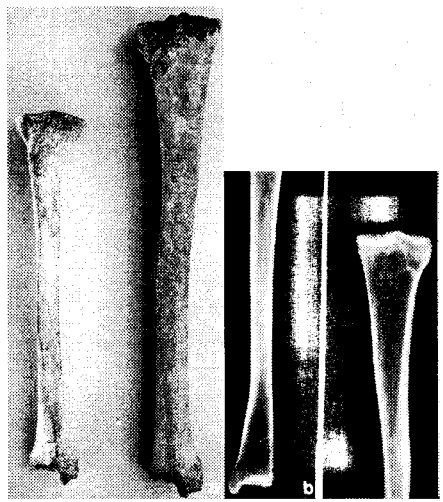


Figure 17: Right tibial bones. a) Giant and female of the average stature from the same skeletal series. Degenerative changes in the epiphyses of the giant's bones. b) Giant - X-ray of the bone. Harris line are visible.

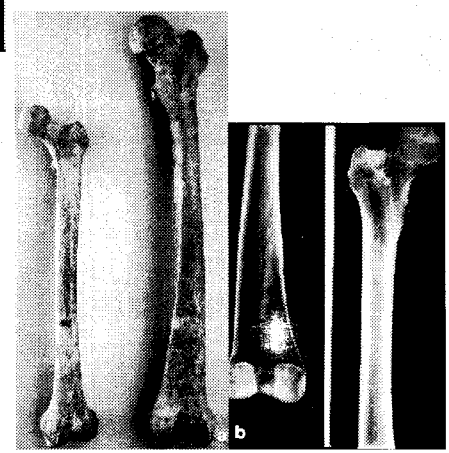


Figure 18: Right femoral bones. a) Giant and female of the average stature from the same skeletal series. Degenerative changes in the epiphyses of the giant's bones. b) Giant: X-ray of the bones. Harris line are visible.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Figure 19: Schmorl's node on: a) cervical vertebra, b) thoracic vertebra and c) lumbar vertebrae.

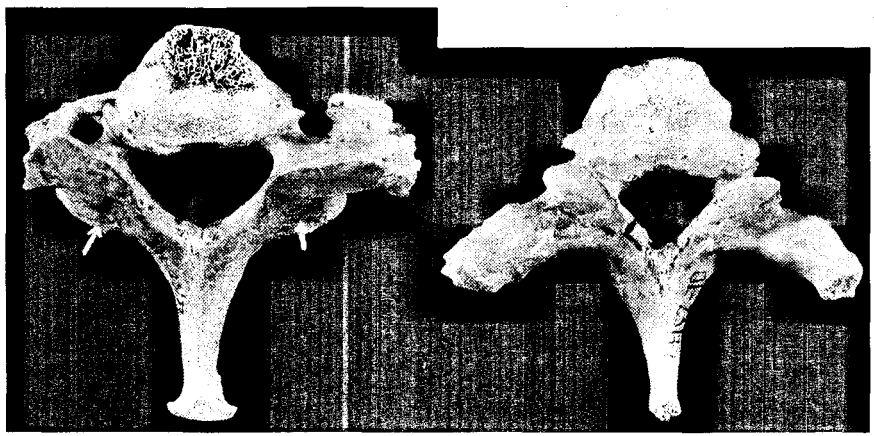


Figure 20: Traces of extensive loading on: a) cervical vertebra and b) thoracic vertebra.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

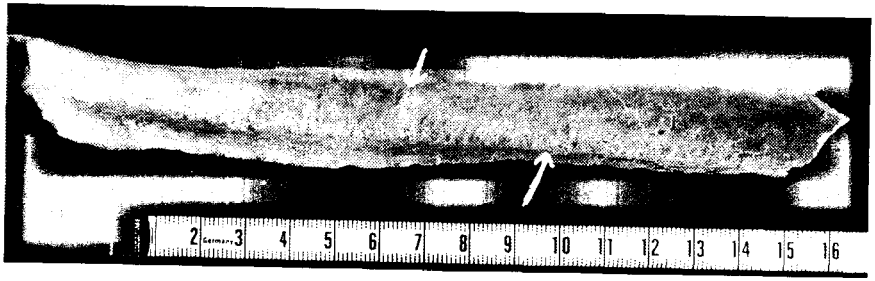


Figure 21: Fragment of a rib with traces of inflammatory process.

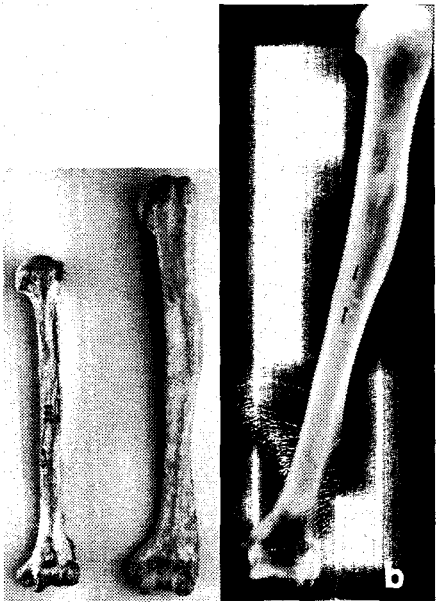


Figure 22: Right humeral bones. a) Giant and female of the average stature from the same skeletal series. b) Giant: X-ray of the bone with apparent fissure of fracture.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

23-24

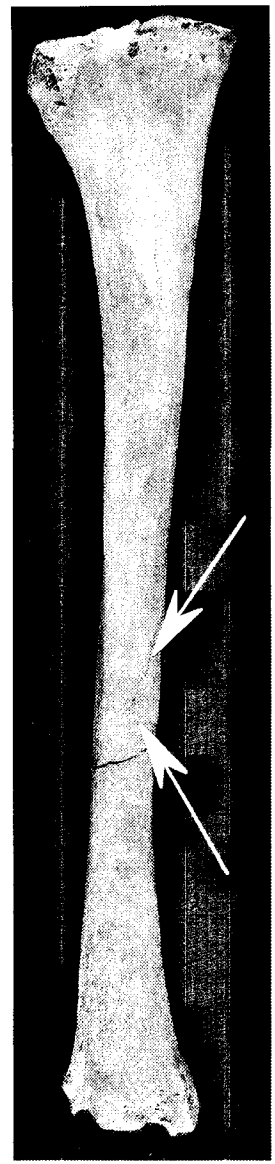


Figure 23: Left tibia with trace of well-healed fracture.

Figure 24: First cervical vertebrae (*atlas*) with a bridge on the left said (*canalis arteriae vertebralis sinistra*) and b) *foramen venosum.*

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

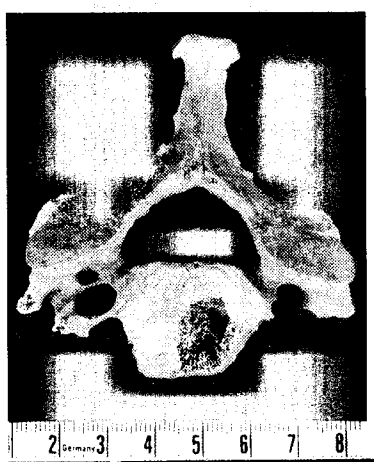


Figure 25: Last cervical vertebrae with double transversae foramens.

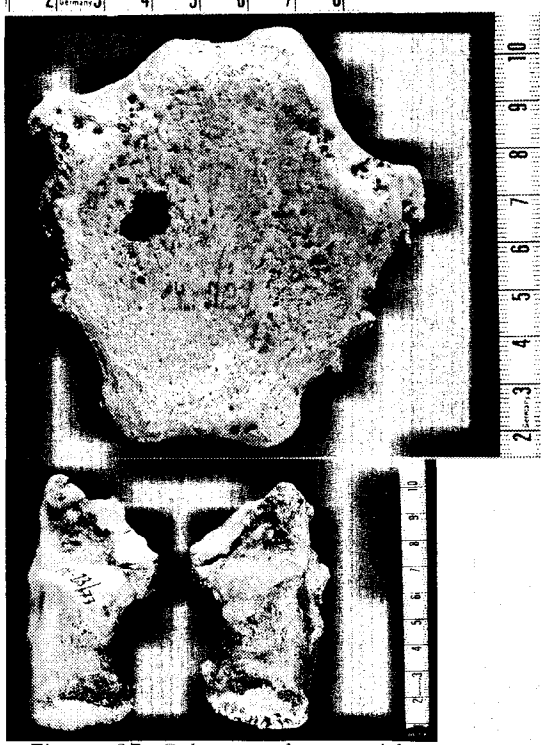


Figure 26: Manubrium sterni without incisura sterni.

Figure 27: Calcaneus bones with various articular facete.

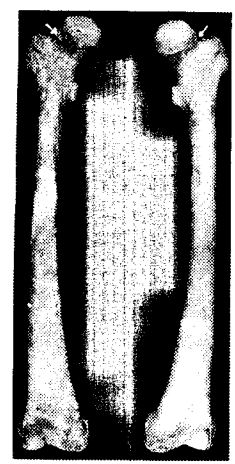


Figure 28: Femoral bones - Poirier's facete.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

auditory meatus is totally obliterated due to by osteoma (Fig. 7 a and b). Also almost obliterated are the fossa and foramen of the jugular vein (Fig. 8). Extensive sclerotisation was noted on the left temporal bone and partial ossification on the left lateral part of the occipital bone. Other characteristics noted were sclerotic remodeling of the body and sinuses of the sphenoid bone (Fig. 9 a, b and c); flattening of the sella turcica: enlargement of the size - extension of the inlet plane, dorsum sellae is deflected posteriorly, clinoid processes are destroyed (Fig. 10); and excessively enlarged paranasal spaces and right mastoid cells (Fig. 7 a, b and 9c).

Degenerative changes were noted in the vertebral column: partial fusion of two last thoracic vertebrae (Fig. 11 a, b) and L_{2-3} with ossification of the right anterior longitudinal ligament, so-called fused "candle wax" ossification (Fig. 12). Extoses (Fig. 13 a, b), and traces of chondropathy (Fig. 14). Strongly deformed auricular facetes of the sacral bone (Fig. 15a), long exostosis in the sacral canal (Fig. 16). Degenerative changes in the epiphysis of all bones e. g. Fig. 17 a, b, 18 a, b.

Traces of extensive loading: scoliosis (Fig. 2), Schmorl's node (Fig. 19 a, b, c), an impression under the superior articular facets of the vertebrae (Fig. 20 a, b) and flattened bodies of vertebrae (Fig. 12, 13).

Inflammatory changes are visible on internal surface of the ribs (Fig. 21) probably caused by tuberculosis. Traces of fractures on the right humerus (Fig. 22 a, b) and left tibia (Fig. 23) double transversae, foramens on the last cervical vertebra (Fig. 24) and Harris lines on both femur and tibia bones (Fig. 17, 18) are observed.

Some developmental deviations: bridge on the left said on the atlas (*canalis arteriae vertebralis sinistrae*), and *foramen vernosum* (Fig. 25 a, b), manubrium sterni without incisura sterni (Fig. 26) various articular facete on the calcaneus bones (Fig. 27) are also observed. On the both femoral proximal epiphisis are Poirier's facet (Fig. 28).

Summary of Conclusions

1. Morphological and radiological changes as int.al. excessive body height, proportional body build, change of the shape of sella turcica, and disproportionately large mandibles are evidence that the female from Ostrów Lednicki suffered from serious disturbances of the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

pituitary gland which caused gigantism at a young age and acromegaly after epiphyseal closure.
2. Sclerotisation of the left temporal bone caused by osteoma and partial ossification of the left part of the occipital bone hindered blood flow, and resulteed in compression of the nerves (IX, X, XI) and hearing impairment.
3. Carelessness of putting the body into the grave also evidences „distinctness" of the buried female.
4. Gigantism, as known from literature, is a rare endocrinal disturbance found in modern as well as in past times.

Acknowledgement

Our thanks are extended to Mrs. Ewa Nowak from the Department of Radiology Medical Academy of Gdañsk.

References

Antoniewicz W.
1906 Giants and dwarf. Wszechœwiat, 25, 32, 504-508 (in Polish).
Bergland R. M.
1965 New information concerning the Irish Giant. *J. Neurosurg.*, 23, 265-269.
Brothwell D., R.
1981 Digging up Bones. The excavation, treatment and study of human skeletal remains. British Museum (Natural History), Oxford University Press.
Dokládal M.
1968 Kosterni pozústatky morawského obra Josefa Drásala, Zprávy (S. Společnosti, Antropologické pri Čs. akademii věd, 31-2-3, 22-26 (in Czech).
Dokládal M.
1969 Die Osteologie des Mährischen Riesen Josef Drásal, *Anthropologie* 7/1, 9-24.
Friese F.
1975 Der Rizenzahn und der Giant. *Zahnaerzliche Mitteilungen*, 65 (18), 873-875.
Fuschs D. H.
1935 Pictures of giant. *J.A.M.A.*, 104, 490.
Hayles M. D.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

1980 Gigantism. *Pediatric Annales*, 9 (4), 163-169.

Hook E. B., Reynolds J. W.

1967 Cerebral gigantism: endocrinological and clinical observations of six patients including a congenital giant, concordant monozygotic twins, and child who achieved adult gigantic size. *The Journal of Pediatrics*, 70, 6, 900-914.

Humberd C. D.

1936 A twenty-five year-old error in measuring a giant. *J.A.M.A.*, 106, 1713-1715.

Humberd C. D.

1937 Giantism: report of case. *J.A.M.A.*, 108, 544-546.

Hutschinson J.

1900 Longevity in giants. *Medical Journal*, New York, 79, 89-133.

Johnston D. J.

1993 Wysoki wzrost (high stature). Aktualności pediatryczne, 2, 3, 174-177 (in Polish).

Keith A.

1911 An inquiry into the nature of the skeletal changes in acromegaly. *Lancet*, 1, 993-1002.

Keith A.

1913 Abnormal crania. Achondroplastic and acrocephalic. *J. Anat. Phys.*, 47-189.

Keith A. (after Sandison, Wells, 1967)

1931 New discoveries relating to the antiquity of Man. London, Williams and Norgate (after Sandison, Wells, 1967).

Landolt A. M., Zachmann, A.

1980 The Irish Giant: a new observations concerning the nature of his ailment. *Lancet,* 1 (8181), 1311-1312.

Larger R.

1916 L'acromégalie-gigantisme, cause naturelle, de la dégénérescence et, partant, de l'extinction des groupes animaux actuel et fossiles. *Bull. Mém. Soc. Anthrop.* Paris 6, 7-22 (after Sandison, Wells, 1967).

Ljunggren B.

1984 A giant with a sick brain. *Årsskrift/Sydsvenska medicinhistoriska sällskapet,* 21, 77-85 (in Swedish).

London S. J.

1968 Giants of Paumanok. *New York State Journal of Medicine*, 68, 1175-1182.

Mahoudeau

1916 Comments on Larger (Q.V.). *Bull. Mém. Soc. Anthrop.* Paris 6, 7-22 (after Sandison, Wells, 1967).

Martin R., Saller S.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

1957 Lehrbuch fuer Anthropologie, 1, Stuttgart.

Mc Alister N. H.,
1974 John Hunter and the Irish giant. *Can. med. Assoc. J.*, III, 256-257.

Nerlich A., Parsche F., Wiest I., Löhrs U.
1994 The Skeleton of the Tegernsee Giant: Macroscopic and histologic findings. *Homo*, 45/Suppl. p. 90.

Perkins M.
1931 Acromegaly in the Far North. *Nature*, 128-491. (after Sandison, Wells, 1967).

Pirsig W., Merkle E., Nerlich A., Parsche F., Löhrs U.
1994 The Skeleton of the Tegernsee Giant: Radiological and endoscopic findings. *Homo*, 45/Suppl. p. 102.

Sandison A., Wells C.
1967 Endocrine disease. In: Diseases in Antiquity, Springfield, Illinois, C. C. Thomas. Chap. 43.

Szymczyk B., Wlsowska E., Ziêtek A.
1977 Przypadek gigantyzmu we wczesnoœredniowiecznym materiale szkieletowym z Ostrowa Lednickiego. *Przegląd Antropologiczny*, 43, 2, 334.

Talko-Hryncewicz J.
1921 O olbrzymach i karl·ach. Prace i Mat. Antrop. *Kom. Antrop. P.A.U.*, 2,65-79.

Tamminen M.
1976 The Lapland giant. Daniel Cajanuksen muotokura Suomo Museo, 83, 93-108 (in Finnish).

Todd T. W.
1914 Paleolithic giant and dwarfs. Cleveland Medical Journal, 13 (8) - 533 (after Sandison, Wells, 1967).

Vogl T. J., Nerlich A., Dresel S. H. J., Bergman C.
1994 CT of the "Tegernsee Giant": Juvenile gigantism and polyostitic fibrous dysplasia. *Journal of Computer Assisted Tomography*, 18 (2), 319-322.

Wells C.
1974 *Antiquity*, 48 N. 192, 298-302.

Wells L. H.
1963 Stature in earlier races of mankind. *Science in Archeology*, 365-377.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

MacLean's Triune Brain and the Origin of the "Immense Power Being" Idea[1]

M. Ernandes and S. Giammanco
University of Palermo

The author surveys the evolutionary structure of the human brain in relation to the phenomenon of human religiosity, with particular reference to the synthesis of serotonin and the human tendency to search for and recognize a "group leader."

Key words: Triune Brain, Religion (origin of), Theism, Serotonin

Premises Concerning the Biological Basis of Religion

Before discussing the problem of the origin of the idea of an "Immense Power Being," we consider it to be necessary to state two premises:

1) it has been established by Kant (1781) that it is impossible to prove rationally the existence or the non-existence of God (= the "Immense Power Being");
2) the idea of some "godly power" has existed in all known human societies in one form or another.

The problem is now to explain how and why such an idea exists, and, since it exists in a natural being, it is pertinent to research such a question by means of the natural sciences, remembering that "Thoughts and beliefs are necessarily dependent on neuro-physiological activity of the brain" (Delgado 1969).

Brain activity, in turn, is determined firstly by genetic property,

[1] Various anthropological explanations for the phenomenon of religion have been advanced. These include the suggestion that magic arises when Man attempts to manipulate what he deems to be supernatural forces, whereas religion evolves when he concludes that these forces are too powerful to be manipulated and must therefore be conciliated. Monotheism has been explained by reference to the respect and need for a "father figure," acquired during childhood. This paper makes yet another stimulating contribution to the corpus of ideas surrounding the anthropology of religion.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

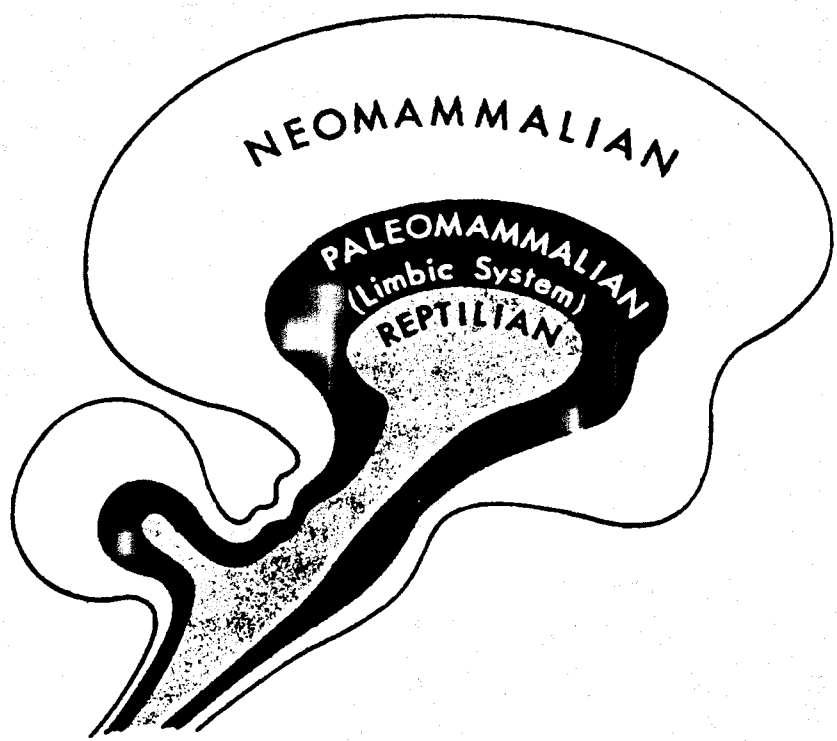


Fig.1

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

which predetermines brain structures, their possible contacts, and their learning abilities, and, secondly, by environmental influences which, received by the brain structures, may influence the activities and devlopment of the latter.

The brain structures from which physiological capabilities and behavior proceed are the result of a long evolutionary course during which they have been selected for providing the best adaptations to external environment. According to Lorenz (1973), the "glasses" of our way of thinking and seeing (i.e. casualness and constancy connections, space and time) are functions of a neurosensorial organization developed in service of species preservation.

Religious ideas have the peculiarity of being universal: as reported by A. Brelich (1970), "No society has been found, even among the most 'primitive,' which was devoid of any faith in divine beings endowed with personal features."

It is thus possible to suppose that religion has a biological basis given that it is universal or near-universal.

According to Leakey and Lewin (1977), we say that when an aspect of behavior is universal to human societies it may be permissible to suspect that it has some kind of genetic basis.

Based on these premises we can surmise that religious behavior and thought may be rooted in a specific genetic predisposition. This does not involve any assumption that the idea of a divine being is "innate", but merely that it is naturally conceivable, thinkable, in the human mind – and that in the human brain there are certain anatomic and physiologic structures which in particular environmental circumstances have favored the birth of religious ideas, and that such ideas often become a part of the cultural heritage.

MacLean's Triune Model of the Brain

Genetic predisposition operates through the development of encephalic structures. P. D. MacLean (1970/1990) elaborated a model of brain structure and evolution. He described it as a "Triune brain", because he located in it three principal phylogenetic structures that have been superimposed and that have become integrated during evolution. He terms these three basic types reptilian (Protoreptilian, R-complex), old mammalian (Paleomammalian, Limbic System) and new mammalian (Neo-mammalian) (Fig. 1). (This subdivision is a

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

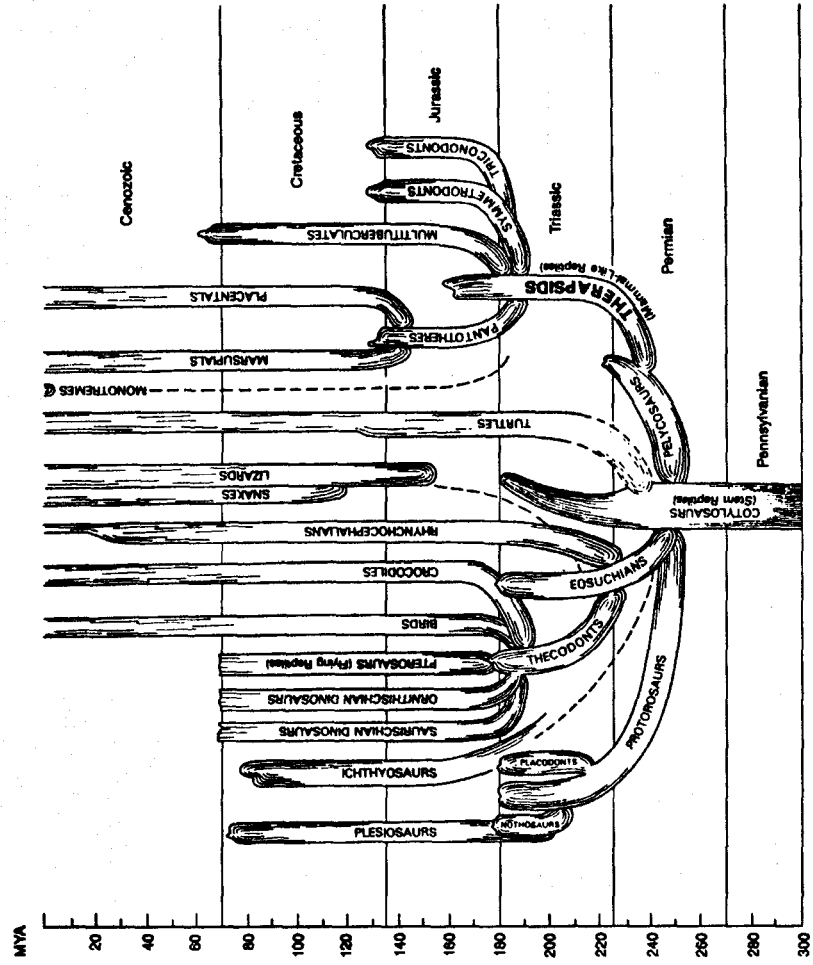


Fig.2—Cactus tree, schematizing evolutionary radiation of reptiles. Rightmost branch gives emphasis to the therapsid line leading to mammals. MYA indicates million years ago (from MacLean 1990).

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

simplification, since small nervous centers referable to the Limbic System or to the Neocortex may be found, as *primordia*, in reptiles).

"The protoreptilian brain is thought to represent a fundamental core of the nervous system, consisting of systems in the upper spinal cord and parts of the midbrain, the diencephalon, and the basal ganglia" [i.e. the olfactostriatum (*olfactory tubercle* and *nucleus accumbens*) and structures defined as part of the *corpus striatum (caudate nucleus, putamen, globus pallidus*, and satellite collections of gray matter) (MacLean 1985 a, p. 220)]... "MacLean believes that what is the R-complex in the brains of existing mammals derives from a form of mammalian-like reptiles that once populated the earth in large numbers" (Isaacson 1982, p. 240). "For comparative neurobehavioral work, it is regrettable that no existing reptiles are directly in line with mammals [fig.2]. One of the 'primitive' mammal-like reptiles was so lizard-like in appearance as to receive the name *Varanosaurus*, a term alluding to the monitor lizard, of which the Komodo dragon is an outstanding example. For this and other reasons, we have favored the use of lizards in our comparative studies" (MacLean 1985 b, p. 408-9).

According to MacLean (1973 a, p. 8) "the counterpart of the reptilian brain in mammals is fundamental for genetically constituted forms of behavior as selecting homesites, establishing territory, engaging in various types of display, hunting, homing, mating, breeding, imprinting, forming social hierarchies, and selecting leaders". As Isaacson observes (1982, p. 246), "The R-complex is necessary for ritualistic displays and the averbal communication associated with them. At the human level, MacLean believes that certain behavioral tendencies are due to an inheritance of dispositions mediated by this same, primal brain region. These include certain violent reactions, the preference for routine or 'ritualistic' actions, and some forms of displacement activities."

The Limbic System includes the olfactory bulb, septum, fornix, hippocampus, amygdala and cingulate gyrus.

> The paleomammalian brain, or the limbic system, represents an advance in neural tissue because it represents a device for providing the animals that have this tissue with better means of coping with the environment. Parts of the limbic system are

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

> concerned with primal activities related to food and sex; others are related to emotions and feelings; and still others combine messages from the external world with those from inside. Disruption of the usual activities of the limbic system by epileptic activities or episodes can produce a host of experiences and feelings, some of the most interesting being those associated with knowledge of fundamental truths, feeling of depersonalization, hallucinations, and paranoid feelings (MacLean 1970). (Isaacson 1982, p. 246).

Concerning the feelings associated with "knowledge of fundamental truths," MacLean (1973 b, p. 123) writes: "It seems that the ancient limbic system provides the ingredients for the strong affective feeling or conviction that we attach to our beliefs, regardless of whether they are true or false!" Isaacson adds:

> Another way to conceptualize the limbic system may be to see it as a regulator of the R-complex. On the basis of behavioral analysis, this regulation seems to be inhibitory in nature. Stimulation of the limbic system often produces a suppression of ongoing behavior, and lesions made within it often seem to 'release' various activities. (Isaacson 1982, p. 246).

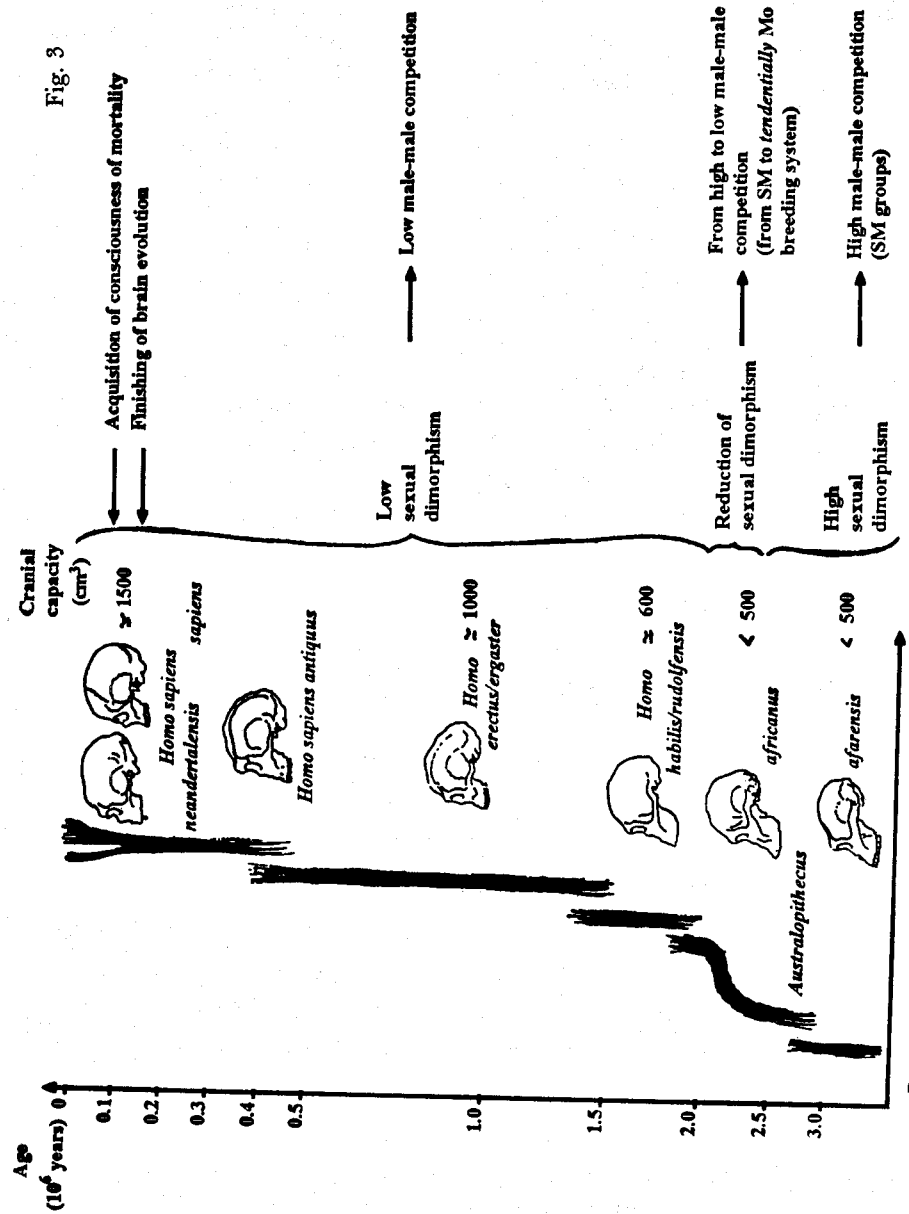
"The neomammalian brain consists of the Neocortex and structures of the brainstem with which it is primarily connected" (MacLean 1985 a, p. 220), as *lemnisci* and *pyramidal tracts* and also the *neothalamus*.

The Neocortex is one of the most extensively studied nervous structures, but at the same time one of the least known. It is, on the human level, the seat of language and, in general, it is the seat of those behaviors that allow a person to tackle new and unexpected situations. The ability to foresee the future resides in it.

We owe conscious thought to the Neocortex: it is the seat of self-consciousness, of space and time conceptions, of the connections of causality and constancy.

The activity of the Neomammalian brain is mutually influenced by the Limbic System and by the R-complex: "it should be emphasized ... that the three brain types are in no sense separate, autonomous entities, although they are capable of functioning some-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

what independently" (MacLean 1973 b, p. 114).

"It cannot be overemphasized that these three basic brains show great differences in structure and chemistry. Yet all three must intermesh and function together as a *triune* brain. The wonder is that nature was able to hook them up and establish any kind of communication among them." (MacLean 1973 a, p. 7). As regards the structure, in the R-complex neurons form some masses (*nuclei* or *ganglia*); in the Limbic System besides nuclei there are *pallial* (or *cortical*) structures, in which neurons are disposed in three layers (*allocortex*). Ariëns Kappers (1909) designated the lateral *pallium* (i.e. the *piriform cortex*) as the *paleopallium* and the medial *pallium* (i.e. the *hippocampus*) as the *archipallium* (MacLean 1990, p. 254; Voogd *et al.* 1998, p. 1872). The dorsal pallium gives rise to *neopallium*: in it, cortex (*isocortex*) has neurons disposed in six layers. As regards the chemistry, researches have found less marked differences: while, for example, acetylcholine and dopamine are typical of R-complex (MacLean 1990, pp. 38-43), serotonin is present in all three brain types (see below, § *Neurobiological correlations*).

The R-complex has the capacity of fixing connections among phenomena, but in a different form compared with the Neocortex: the connection is not rational but rather temporal ("*post hoc, propter hoc*"). This leads to routine activities, in conformity with precedent situations, ritualistic changes of behavior, or, as evident in human beings, to obsessions and compulsions (magical thought).

This kind of connection among phenomena become conscious, and it may be stated by language, in the Neocortex.

The Limbic System, in turn, adds an emotional component to these activities, producing a relaxed condition when they are completed, and an anxious condition when they are brusquely interrupted or changed.

The Neocortex has "induction" capacity: from the particular observations that different phenomena are effects of certain causes, it infers that "every phenomenon is the effect of a cause".

Therefore, the Neocortex tends to establish causal connections in some rational way among phenomena: it is able to do this more or less well, according to its knowledge.

Resuming our theme, the causal connection among phenomena fixed by the whole brain operate as follows:

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

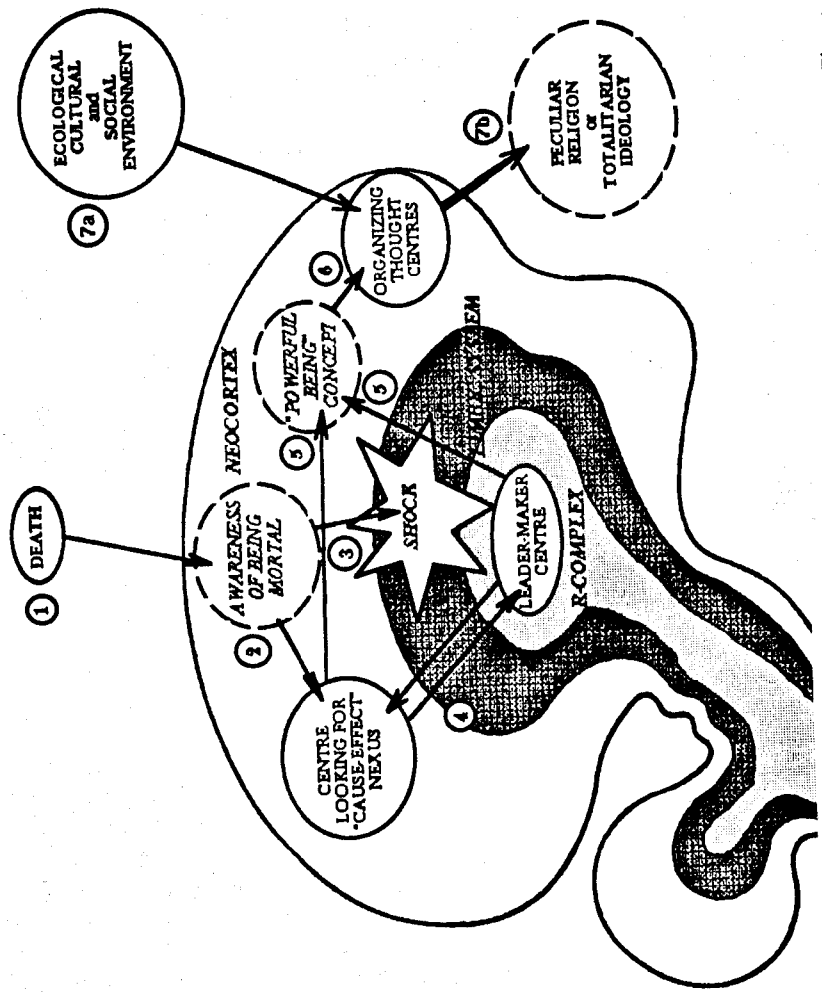


Fig. 4

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

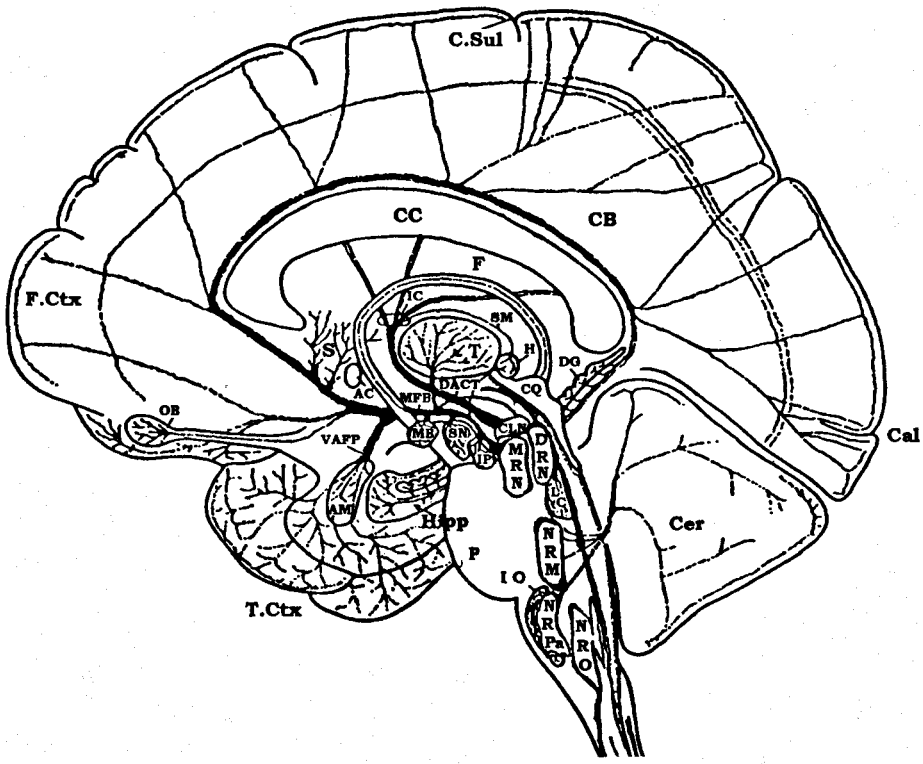
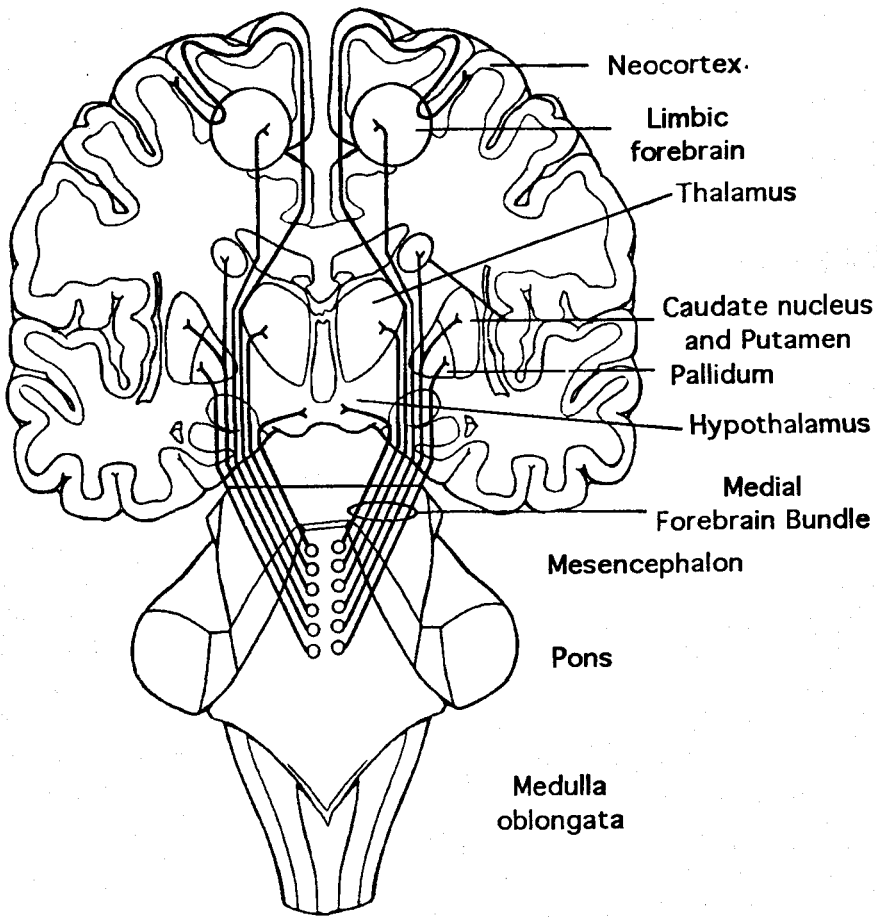


Fig. 5a and 5b. Views of the primate serotonergic system. Fiber pathways are shown as broken lines. AC, anterior commissure; Am, amygdaloid nuclei; CB, cingulum bundle; CC, corpus callosum; Cal, calcarine fissure; Cer, cerebellum; CLN, caudal linear nucleus; CQ, corpus quadrigimini; C.Sul, central sulcus; DG, dentate gyrus; **DRCT, dorsal raphe cortical tract; DRN, dorsal raphe nucleus;** F, Fornix; F.Ctx, frontal cortex; H, habenula; Hipp, hippocampus; IC, internal capsule; IO, inferior olivary nuclei; IP, interpedincular nucleus; LC, locus coeruleus; MB, mammillary body; **MFB, medial forebrain bundle; MRN, median**

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



raphe nucleus; NRM, nucleus raphe magnus; **NRO, nucleus raphe obscurus; NRPa, nucleus raphe pallidus;** OB, olfactory bulb; P, pons, S, sectum; SM, stria medullaris; SN, substantia nigra; T, thalamus; T.Ctx, temporal cortex; VAFP, ventro amydalofugal pathway.

DRN, MRN, NRM, NRO, NRPa: serotonergic nuclei.
DRCT, MFB: fiber pathways.
(Modified from Jacobs & Azmitia 1992).

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a) in a rational verifiable way, if the Neocortex can find the cause;

b) in the case of magical thought, that is to say, ideas that are not verifiable, which are characterized by more or less high levels of illogicality, and are held by faith. Magical thought has its unconscious origin in the R-complex, and is made conscious by the Neocortex, which tries to give it an appearance of rationality.

Dominance-Submission Behavior in Religion

Religious behavior is associated with dominance-submission relations: "... in a behavioral sense, religious activities consist of the coming together of large groups of people to perform repeated and prolonged submissive displays to appease a dominant individual. The dominant individual concerned takes many forms in different cultures, but always has the common factor of immense power" (Morris 1967; 1994, p. 121). (This reaffirms Brelich's assertion on the character of divine beings).

In MacLean's model of the brain it is the nervous structure that presides over hierarchic behavior, as in the case of submission to a chief, is the R-complex.

The Limbic System, with its regulator action, normally prevents behavior determined by the R-complex from showing itself in a rigid, autonomous and stereotyped way.

The septal area is very important in the control of sexual functions, while the amygdaloid area is associated with aggressive behavior. Sexual functions, more evidently in paleomammals, are related to the rhinencephalon and consequently to the olfactory structure.

Dominance-Submission Behavior in Primates

The hypothesis that religious behavior, religious thought and the origin of the "Powerful Being" idea are natural may be substantiated by evidence of the roots of such behavior among Hominids and non-human Primates. For the validity of this hypothesis it is indispensable that we find:

a) dominance-submission behavior;
b) the existence of a "chief figure," potential or in action.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

In mammals strong links have been established between sexual and dominance-submission behavior, so that male genitals and sexual behavior signify dominance while female genitals and behavior become symbols of subordination. Such valences of sexual behavior and genitals are evident in primates, including *Homo sapiens*. Thus, with dominance-submission behavior constituting a very important aspect of primate social life, we find that primate societies may be grouped according to breeding systems as follows:

a) monogamous breeding systems (Mo);
b) single-male breeding systems (SM);
c) multi-male breeding systems (MM).

These systems tend to be correlated with sexual dimorphism in body size and in canine tooth size (intrasexual dimorphism resulting from male-male competition). Monogamous species show a low degree of dimorphism, single-male and multi-male show a variable degree, associated with variation of male-male competition. (Clutton-Brock and Harvey 1977; Leutenegger and Kelly 1977; Harvey *et al.* 1978; Pickford and Chiarelli 1986; Hinde 1987; Plavcan and van Schaik 1994).

Plavcan and van Schaik (1992) classified primate species into four "competition levels", labeled from 1 to 4, on the basis of the "intensity" and "potential frequency" of male-male competition. Competition level 1 contains low-intensity, low-frequency species. Competition level 2 contains low-intensity, high-frequency species. Competition level 3 contains high-intensity, low-frequency species. Competition level 4 contains high-intensity, high-frequency species. Low-frequency competition is typical of breeding groups that contain only a single, adult male: so monogamous species belong to level 1, while single-male species belong to level 3. "Multilevel societies such as *Papio hamadryas*, *Theropithecus gelada*, and *Nasalis larvatus*, in which single male breeding groups come together to form large groups daily" (Plavcan and van Schaik 1997), belong to level 4 because they are high frequency species. Multi-male species are divided into three competition levels (2, 3, and 4). According to Plavcan and van Schaik, "increasing sexual dimorphism in both canine tooth size and body weight is strongly correlated with increasing

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

competition level" (1997, p. 353). Such correlation allows us to assess competition level from sexual dimorphism, and vice-versa.

Dominance-Submission Behavior in Hominid Phylogeny

The study of fossil species which are thought to have been our ancestors shows that in them sexual dimorphism was high nearly until two millions years ago, after which it declined (body size dimorphism) or was absent (canine tooth size one) down to the present. Dimorphism in fossils is evidence of male-male competition, but it does not allow us to ascertain whether species which showed it were single-male or multi-male.

What is important, to our study, is only male-male competition. Plavcan and van Schaik (1997) have noticed that body weight dimorphism estimates in *A. afarensis* are compatible only with competition level 3 or 4 species (p. 365), and that "only competition level 3 overlaps dimorphism estimates of all four occlusal dimensions" of canine teeth.

For the genus *Homo*, as we said above, body size dimorphism is low (competition level 1-2), and canine tooth size dimorphism is absent (competition level 1).

We suggest that an SM society correlated with high dimorphism, and the Mo society correlated with low or very low dimorphism. We are not able to assert this with absolute certainty but only to point to the presence or absence of male-male competition.

In fig. 3, fossil species which are thought to be inside the human phylogenetic tree (Chiarelli 1991, 1995; Wood 1994; D'Amore 1996; Chaline *et al.* 1996) are correlated with estimates of their dimorphism and of male-male competition.

We have correlated an SM social system (in the sense above specified) to the *Australopithecus aferensis*' dimorphism; to the lack of canine dimorphism of following species (particularly from *Homo rudolfensis/habilis*) a tentatively Mo social system. ("Tentatively Mo" because *Homo sapiens* has produced various kinds of marital systems, but whenever favorable environmental/social circumstances occurred, there has been a reappearance, at least in part, of an SM social system, with lawful or tolerated polygyny).

Since religious displays are characterized by submission to a dominant individual, they may be at least in part the expression of an

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

SM social system which has its neurological background on "hierarchy-forming" structures of the R-complex, according to MacLean's model (MacLean 1973 a). (On the other hand, a dominant individual might not be conceived by a brain which was not prepared to conceive individual relations as hierarchic relations). Therefore, the "Immense Power Being" concept, which has its "unconscious" origin in the R-complex, results from rationalization and projection of the image of a group's dominant individual in a superhuman world, and this projection and rationalization is executed by the Neocortex.

How did it happen, therefore, that among human beings with a documented low male-male competition social system we can find a projection in the super-human world of a being with immense power, such as is associated with a high male-male competition social system?

Although inhibited by the Limbic System, the human brain R-complex preserved (and still preserves) the structures and hierarchy-forming functions which give rise to submission to leaders. The neocortical elaboration of the concept of an "Immense Powerful Being" can only be created, according to MacLean's model, by an action of the R-complex on the Neocortex. Consequently we can deduce that at some time in the course of human evolution such a nervous structure was set free by the inhibitory action of the Limbic System, presumably as a consequence of a strong external stimulus which, causing a psychic trauma, weakened the inhibitory action of the Limbic System.

The Traumatic Stimulus and its Consequences

We could presume that this traumatic stimulus has been caused by the acquisition of the consciousness of man's own mortality, since the thought of death would be traumatic (Chiarelli 1984, p. 303, "the sole experience that equalizes all the human beings is death. Probably it is this unifying factor, the mental condition that has led the most ancient thinking beings to produce a doctrine of the soul").

Homo sapiens is the only animal who knows he is mortal. He does not immediately recognize this fact as a natural datum. He rather feels that it is a violence he has to suffer, and it could have been considered so by the first *Homo sapiens* who were conscious of it. We cannot know when this took place, but we do know that more

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

than 50,000 years ago *Homo sapiens neandertalensis* buried his dead.

The Neocortex seeks to determine causal connections between events, and this has induced *Homo sapiens* to look for the cause of that violence.

At the same time, in consequence of the traumatic stimulus given by consciousness of mortality, the Limbic System activity on R-complex would have experienced a variation that:

a) caused the R-complex structures which produced hierarchic behavior to emerge at the neocortical (conscious) level;

b) led to the neocortical structures, which sought cause-effect rationale for mortality, to accept the idea, proposed by the R-complex, that a "Powerful Being" is the agent of death.

In fig. 6 the stages of the formation process of religious ideas may be schematized in relation to the functions of MacLean's brain structures:

1) *Homo sapiens* perceives death.

2) In the Neocortex there is the awareness of being mortal, and in the same time death, as an inevitable fate, is felt as a violence.

3) The Limbic System receives this awareness and turns it into an emotional stimulus affecting the Neocortex and R-complex; at the same time its inhibitory action on the R-complex decreases.

4) In the R-complex, violence is performed by a dominant individual. The neocortical center, searching for a "cause-effect" nexus to explain death, recognizes in the concept of a dominant individual, which had originated in the leader-maker center of the R-complex, the agent of mortal violence inflicted on humanity, and so it accepts the "Immense Powerful Being" concept.

5) The neocortical centers of organizing thought, in relation to the ecological, cultural and social environment (5a) develop a system (5b) of myths in order to explain mankind-god relations (first the reason of inflicted mortal violence) and a

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

system of rites which allow the establishment of some kind of communication between mankind and the Powerful Being(s). (As the invisible "Powerful Being" is the "chief" of human beings, he is like them, that is to say, human beings are like him, and so also human beings have an invisible part, the soul).

The typical human capacity of thinking an insensate Being has probably been favored by oneiric activity. The "World of Dreams", in fact, could have been explained by the first human beings as a reality-apart from, different from, the sensate one, but not less real. In support of this idea, we note that in religious thought dreams have often been seen as a form of communication with the divine.

What has been proposed in the above paragraph is the process by which the concept of a Divine Being emerged among the first human beings who were conscious of their mortality and tried to understand it consciously. Conceptions of divine and sacred are facilitated, canalized and molded by the social and religious structures in which each individual lives and in which he is educated. Moreover, it must be recalled that only the Neocortex is capable of critical thought: the R-complex and Limbic System tend to be associated with non-critical belief systems.

Initiatory rites occur in critical ages of individual development with emotional involvement. They mainly operate on the Limbic System and R-complex. The Limbic System provides the ingredients for the strong affective feeling of conviction attached to beliefs, while the R-complex is the seat of "imprinting". Repeated emotional experiences and environmental forces encourage imprinting, until religious beliefs as to the existence of a supernatural Powerful Being become strong and well-established.

In certain historical circumstances, a religion may be accompanied or replaced by an ideology that assigns a metaphysical purpose to mankind or to history. Such ideologies involve experiences which are akin to religion.

Parallelism between the Group Chief and the "Powerful Being"

The chief of a group (specially in Single Male groups) exercises his power on a territory, dominating other males, which have a submissive behavior in regard to him, and have priority in access to

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

food and to females.

As "Powerful Being" is the projection of group-chief, we might notice in divine beings of various religions, beyond cultural variations, the manifestation more or less complete of group-chief prerogatives.

a) Territorial domination. This may take the form of control over a single people or be more wide, to include all the world.

b) Domination over males. This may be shown in various ways in which males:

- assume positions that denote submission and originate from the female sexual presentation;
- submit themselves to sexual mutilations (such as circumcision) that symbolizes castration or a reduction of masculinity, so that full masculinity remains an exclusive attribute of the "Powerful Being".
- are required to abstain from sexual relations.

c) Priority in food access: ritual offers, especially of early fruits.

d) Ownership of females: matrimonial rites, consecration of virginal maidens to the service of the god, or, on the contrary, sacred prostitution, by which the god shows his magnanimity towards submissive males. In some cases the priority in female possession is delegated by the god to his representatives on earth (*"ius primae noctis"*). It is not surprising that if males must assume a submissive attitude toward the "Powerful Being", females mustt do likewise.

Neurobiological Correlations

The reduction of the inhibitory action of the Limbic System on the R-complex is a crucial event in our reconstruction of the origin of religion. We must seek to check our theory against what is currently understood about the Limbic System and the neurotransmitters involved.

Serotonin (or 5-Hydroxytryptamine or 5-HT) is a compound produced in some nervous centers starting from the amino acid tryptophan, and it exerts its effects by acting as a classic neurotransmitter or as a neuromodulator (these effects are due to postsynaptic receptors: 5-HT receptors are many and diversify

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

serotonin's effects in the various encephalic regions. See Baumgarten & Göthert 1997). "Serotonergic neurons are present in all phyla that possess nervous systems" (Weiger 1997). Nervous centers in which 5-HT is produced are raphe nuclei. In fig. 7, a the various mammalian raphe nuclei and their main projections are shown. For Reptiles, "with the indirect immunofluorescence technique using antibodies to serotonin, the distribution of serotonin-immunoreactive (5-HTi) neurons was studied in *Varanus exanthematicus* (Wolters *et al.* 1985). ... In reptiles, only two raphe nuclei can be distinguished; i. e. the rostral, mainly small-celled nucleus raphes superior and the large caudal nucleus raphes inferior containing medium-sized to very large cells. ... Considering their cell size and relative position in the caudal brain stem, the 5-HTi cell bodies found in the caudal part of the inferior raphe nucleus presumably are comparable to those in the raphes pallidus of mammals, those found more rostrally, where large cells dominate, to the nucleus raphes magnus. No apparent homologue of the 5-HTi cells in the mammalian raphes obscurus ... was observed ... . no 5-HTi cell groups were found in the area just dorsal to the fasciculus longitudinalis medialis, i.e. in a position comparable to that of the nucleus raphes dorsalis in mammals. ... A primordium of the nucleus raphes dorsalis, however, may be hidden in the nucleus raphes superior" (ten Donkelaar 1998, p. 1417). Following MacLean's model, in the serotonergic system we can distinguish a reptilian part (i.e. of the R-complex) and a mammalian part (i.e. of the Limbic System), the latter being formed in particular by raphes obscurus and dorsal raphes nuclei. Ascending fibres extend from the pontine nuclei (MRN and DRN in fig. 7 a) to several telencephalic regions, among which are basal ganglia (fig. 7 b).

So, the serotonergic system's evolution is an example of the evolution of the brain according to MacLean's model. In fact we may distinguish in it a reptilian part which is a regulator system inherent to the R-complex itself and to the spinal cord; and a limbic part which greatly increases control over the R-complex and moreover has connections with the Neocortex, in particular with prefrontal cortex (fig. 5 b) which, according to MacLean (1978), helps us to see deeply into other peoples' feelings. Given its numerous projections, the serotonergic system provides the most powerful system of integration and coordination among MacLean's three brain types identified till

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

now.

Different researchers have shown that the reduction of serotonergic action may have different consequences, among which the following are particularly interesting:

a) increase of intraspecific competition;
b) increase of magic-thought;
c) temporal epilepsy.

Intraspecific competition is the means by which social hierarchies within non-human primate groups are formed, and it is linked to R-complex cerebral structures (MacLean 1973 c). Several researchers have shown that an increase in intraspecific competition is positively correlated with a decrease in serotonergic tone in non-human primates (Raleigh *et al.* 1980; Raleigh *et al.* 1991; Higley *et al.* 1992; Mehlman *et al.* 1994). These observations are in keeping with MacLean's triune concept of the brain because they suggest that hierarchy-maker structures are characteristics of the R-complex and that they are controlled by the Limbic System, mainly by the serotonergic system. A reduction of serotonergic tone therefore reduces the resistance to hierarchy-maker structures.

Magic-thought, as reported above, is the form of thought that mainly comes from temporal connections among phenomena that establish irrational connections. It is present in various degrees among human beings, and shows itself in superstitions, in astrologic credence, in minor rituals, in some innocuous phobias. In a certain number of individuals it may worsen and show itself in obsessions and compulsions. According to DSM III (1987) the first ones are recurrent and persistent ideas, images of impulses that are not felt as voluntary products, but rather as extraneous thoughts that invade the conscience and are felt as senseless or disgusting ideas. ... Attempts are made for suppressing them. ...Compulsions are repetitive and apparently-directed behavior which are executed in conformity with certain rules and in a stereotyped way. The behavior is not an end to itself, but intended to produce or prevent some future event or situation. However, the activity is not realistically connected to that which it was intended to produce or prevent, and may be clearly excessive. (Civilized individuals usually recognize the senselessness of

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

such behavior, even if they experience a relaxation of stress, but how was it with the first human beings?).

According to MacLean's model, obsessions are thoughts yielded by R-complex that rush into the Neocortex and show themselves at the awareness level: the suffering individual senses them to be extraneous because the R-complex is yielding its thoughts without adequate neocortical or limbic control. The lack of integration of the triune brain's functions causes the individual to sense something extraneous inside his thoughts that is independent of his will.

The repetitiveness and the stereotype of coactions are clearly typical of R-complex, as stated above.

Rapoport (1989) has located in basal ganglia (R-complex) the origin of obsessive-compulsive disorder (OCD), and has observed reduction of serotonergic tone in it: drugs that increase permanency of serotonin in synapsis are actually those that cure it better.

Temporal lobe epilepsy (or limbic epilepsy) is not always serious, and often may be devoid of evident clinical effects: the individual suffering from it remains conscious and experiences such feelings as "*dejà-vu*", cosmic visions, and dreaming states. It has been studied by Geschwind; reporting these studies, M. S. Gazzaniga (1985) writes that in its basic form it causes an intensification of religious beliefs and eccentric sexual behavior, although not necessarily together. In regard to the religious aspect, not only are convictions intensified, but the form it assumes becomes erratic and the subject easily passes from a belief to another. According to Gazzaniga these clinical phenomena allow us to think that the brain may establish a dynamic equilibrium between systems that generate hypotheses and systems that accept such of these as conform to rational criteria. The normal condition may allow a certain level of irrational and magic beliefs, but the pathologic condition, disinhibited, lowers the reception threshold so far that new beliefs can be readily adopted without critical assessment. Mandell (1980; see also Hooper and Teresi 1986) has linked the temporal lobe epilepsy with the reduction of serotonergic tone, particularly in the hippocampus. According to this author, reduction of serotonergic tone may be obtained also by hallucinogens (such as LSD) or by other activities such as repetitive prayer or religious chants, which accompany the sensorial deprivation associated with monastic life.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

In other works (Ernandes & Giammanco 1992; Ernandes, La Guardia & Giammanco 1996), we have linked nutritional habits to reduction of serotonergic tone and its after-effects. In fact, neuronal synthesis of serotonin, which has tryptophan as its precursor, depends not only on tryptophan availability but also on the plasma trp/LNAAs ("tryptophan/Large Neutral Amino Acids") ratio, because of competition made by LNAAs against tryptophan for neuron access, since they use the same carrier to cross the blood-brain barrier (Fernstrom & Wurtman 1972; Fernstrom 1988; Lehnert & Wurtman 1993). The "Trp/LNAAs" value, in turn, tends to be correlated with amino acid composition of the diet (Yokogoshi & Wurtman 1986): so a low "trp/LNAAs" ratio diet lowers brain serotonin synthesis. Among foods utilized by humans, some, as maize or sorghum, have a low "trp/LNAA" ratio.

Serotonin deficiency, as reported above, involves several behavioral consequences, such as the tendency toward aggressive behavior or religious/ideological fanaticism.

Among native American populations these consequences appeared, as a rule, to be positively correlated with a dietary dependence on maize. Aztecs suffered greatly from serotonin deficiency, to which they unconsciously tried to find a remedy eating foods such as amaranth or human flesh, which, having high "trp/LNAA" ratio, permitted an increase of serotonin synthesis. Thus their cannibalism might well have been associated with a serotonin deficiency associated with a heavy dependence on maize (Ernandes & Giammanco 1992).

In other parts of the world similar consequences are thinkable for some African and even European (i.e. Balkan[2]) populations which depended largely on maize (Ernandes, La Guardia & Giammanco 1996). From these observations we suggest that a low "trp/LNAA" ratio in the food consumed by a people might constitute

[2] **In 1913 the *Carnegie Endowment for International Peace* sent a committee to investigate reports of atrocities made by belligerents in the First Balkan War. Commissaries ascertained "that the war fought a few months ago in Macedonia was characterized by a medieval cruelty. Mass rapes, genital mutilations, people of whole villages butchered in the streets, corpses roasted on the spit, children decapitated under mothers' eyes" (S. Viola 1997).**

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a risk factor towards violence or intolerance. It may be interesting to study nutritional habits in the history of religious fanaticism for possible positive correlations.

The "Powerful" and the "Perfect" Being

The "Powerful Being" of whom we have sketched the origin, has his neurobiological substratum in the R-Complex. He is present mainly in religions.

The human being has afterwards elaborated the "Perfect Being" concept. Such Being, fruit of philosophical elaboration, has his substratum in the Neocortex.

Theological and philosophical speculations have tried to conciliate the "Powerful" with the "Perfect" Being, mainly trying to rationalize and justify actions associated with belief in the Powerful Being which seemed incompatible with human moral standards.

So the human being has reached various conceptions of the Perfect Being, such as Spinoza's "*Deus sive Natura,*" the deism of most of followers of the Enlightenment, the idealistic Absolute Spirit, the Masonic "Great Architect of the Universe". We can make no choice in this regard, even if we think much more likely the existence of a "Perfect Being" which is his neocortical image rather than one of reptilian origin, such as the "Powerful Being".

Conclusions

In summary, the biological basis of religion, or its genetic predisposition, which we have supposed at the beginning, consists in a few generalized structural characteristics of human thought, and in particular:

1) in the capacity to accept "dominant" and "subordinate" roles in a social hierarchy, and recognize these at a conscious and rational level;

2) in the inductive capacity of abstracting from single observations general rules, e.g., in this case of constructing, from the fact of death, a theology based on the fact of mortality;

3) in the refusal to accept death as the end of existence;

4) in the necessity of finding a cause-effect nexus for observed events;

5) in the capacity of "projecting" one's own thoughts and

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

emotions in others, attributing or recognizing these mental contents in others. This ability defines, according to Maser and Gallup (1990), the "mind". "Mind ... is defined by the ability to (1) reflect on ones own thoughts and emotions (i.e. to be aware of being aware) and (2) to use this capacity as a basis for inferring the experience of others" (pag. 522). This explains the "anthropomorphism," from mental to corporeal, of an "Immense Power Being". Moreover, the importance of language has to be noticed: language, by giving to subjective and particular conceptual experience the possibility of becoming collective and general, allowed transformation of awareness of death from individual to collective. We can therefore add that the rise of religion had to follow the development of language.

Nothing in particular can be said about the conceptions that the first human beings had of the "Immense Power Being(s)." The religious beliefs of illiterate peoples cannot be considered as "original" religions, because these peoples also have a cultural history.

The different forms that the divine and the sacred assume in the different religions depend on economic and social structures (Harris 1977, 1979) and on cultural history.

The hypothesis on the origin of religion we have expounded is based on three fundamental points:

a) the human awareness of being mortal;
b) the human tendency to explain observable phenomena (e.g. death) by non-observable causes, such as by magic-inference;
c) the "Powerful Being" as an human projection that is, the "group-chief" idea that human beings have within their brain.

Several scholars have based their ideas on the origin of religion on the one or the other of these factors: for example:

a) on the human awareness of being mortal: Koestler (1978); B. Chiarelli (1983); Maser and Gallup (1990).
b) on magic-inference: Gazzaniga (1985).
c) on the "Powerful Being" as a human projection: Spinoza; Feuerbach; Freud (1913); Morris (1967).

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

In this work we have linked all three.

Acknowledgements: We thank Mr Michele Colletti and Mr Renato Serio for technical aid, and Mrs. Francesca Castigliola for timely transcription of the manuscript; Miss Daniela Carrillo for editing and linguistic aid; Dr Maurizio La Guardia for research carried out into the serotonergic system; Mrs. Angela Costanzo and Mrs. Giuseppina Raspanti, the authors' wives, for support and comments produced; special thanks to Prof. Brunetto Chiarelli, who watched our hypothesis emerging, made helpful comments throughout its development, and suggested its first exposition at the XII National Congress of the AAI (Italian Anthropological Association) in Palermo, 16-20 Sept. 1997.

References

Ariëns Kappers C. U.
1909 The phylogenesis of the palaeo-cortex and archi-cortex compared with the evolution of the visual neo-cortex. *Arch. Neurol. Psychiatry* (London) 4: 161-173.

Baumgarten H. G. & M. Göthert
1997 Serotoninergic Neurons and 5-HT Receptors in the CNS. Berlin: Springer-Verlag.

Brelich A.
1970 "Prolegomenes à une histoire des religions". In: H. Ch. Puech (ed.), Histoire des Religions. Paris: Librairie Gallimard.

Chaline J., A. Durand, D. Marchand, A. Dambricourt Malassé, M.J. Deshayes
1996 Chromosomes and the origins of Apes and Australopithecines, *Human Evolution* 11(1):43-60.

Chiarelli B.,
1984 Origine della socialità e della cultura umana. Bari: Laterza.
1991 Razza umana. Storia e biologia. S. Domenico di Fiesole (Firenze): Edizioni Cultura della Pace.
1995 Man between Past and Future. Washington: Institute for the Study of Man.

Clutton-Brock T.H. & P.H Harvey
1977 primate ecology and social organization. *The Journal of Zoology* 183: 1-39.

D'Amore G.
1996 Recenti progressi in paleoantropologia. Palermo: The International Institute for the Study of Man/Medical Books.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Delgado J.M.R.
1969 Physical control of the Mind. Toward a Psychocivilized Society. New York: Harper & Row.

DSM III
1985 The Diagnostic and Statistical Manual of Mental disorders, III ed. Washington: American Psychiatric Association Press.

Ernandes M., S. Giammanco
1992 A serotonin deficiency hypothesis explaining the Aztec human sacrifice/cannibalism complex. *Antropologia contemporanea* 15 (2): 65-73.

Ernandes M., M. La Guardia and S. Giammanco
1996 Maize-based diets and possible neuro-behavioral after-effects among some population in the world. *Human Evolution* 11 (1): 67-77.

Fernstrom J. D.
1983 Role of Precursor Availability in Control of Monoamine Biosynthesis in Brain. *Physiological Reviews* 63: 484-546.

Fernstrom J. D. & R. J. Wurtman
1972 Brain Serotonin Content: Physiological Regulation by Plasma Neutral Amino Acids. *Science* 178: 414-416.

Feuerbach L. A.
1841 Das Wesen des Christenthums. Leipzig. (The Essence of Christianity, G. Eliot tr., 1989, Prometheus Bks//1958, P. Smith//1942, Harp C.)

Freud S.
1913 Totem und Tabu. Leipzig: Heller. (Totem & Taboo, 1989, Buccaneer Bks//1976, Amereon Ltd//1960, Random).

Gazzaniga M. S.
1985 The Social Brain. Discovering the networks of the mind. New York: Basic Books Inc.

Harris M.
1977 Cannibals and Kings. The Origins of Cultures. New York: Random House.
1979 Cultural Materialism: The Struggle for a Science of Culture. New York: Random House.

Harvey P.H., M. Kavanagh. & T.H. Clutton-Brock
1978 Sexual dimorphism in primate teeth. *The Journal of Zoology* 186: 475-485.

Higley J. D., P. T. Mehlman, D. M. Taub, S. B. Higley, S. J. Suomi, M. Linnoila, J. H. Vickers
1992 Cerebrospinal Fluid Monoamine and Adrenal Correlates of Aggression in Free-Ranging Rhesus Monkeys. *Archives of general Psychiatry* 49: 436-441.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Hinde R.A.
1987 Individuals, Relationships and Culture. Cambridge: Cambridge University Press.
Hooper J. & D. Teresi
1986 The three-pound universe. New York: Macmillan Publishing C.
Isaacson R.L.
1982 The Limbic System. Second edition. New York: Plenum Press.
Jacobs B. L. & E. C. Azmitia
1992 Structure and Function of the Brain Serotonin System. *Physiological Reviews* 72 (1): 165-229.
Kant I.
1781 Kritik der reinen Vernunft. Riga. (Critique of Pure Reason, Politis V. ed., 1993, C. E. Tuttle//Meiklejohn J. M. tr., 1990, Prometheus Books//Smith N. K. ed., 1969, St Martin).
Koestler, A.
1978 The ghost in the machine. London: Hutchinson and Co.
Leakey R.F. & R. Lewin
1977 Origins. New York.
Leutenegger W. & J.T. Kelly
1977 Relationship of Sexual Dimorphism in Canine Size and Body Size to Social, Behavioral, and Ecological Correlates in Anthropoid primates. *Primates* 18(1): 117-136.
Lorenz K.
1973 Die Rückseite des Spiegels. Versuch einer Naturgeschichte menschlichen Erkennens. München: R. Piper & Co. Verlag. (Behind the Mirror: A Search for a Natural History of Human Knowledge, Taylor R. tr., 1978, Harcourt Brace, P. Smith)
MacLean P.D.
1970 The triune brain, emotion, and scientific bias. In F.O. Schmitt (ed.), The neurosciences: Second study program, pp. 336-349. New York: Rockefeller University Press.
1973a A triune concept of the brain and behavior. In T.J. Boag & D. Campbell (eds.), The Clarence M. Hincks Memorial Lectures, 1969, pp. 1-66. Toronto: University of Toronto Press.
1973b The brain's generation gap: some human implication. *Zygon, Journal of Religion and Science* 8: 113-127.
1973c Effects of pallidal lesions on species-typical display behavior of squirrel monkey. *Federation Proceedings* 32: 384 ...
1978 A Mind of Three Minds: Educating the Triune Brain. Chicago: University of Chicago Press.
1985a Evolutionary psychiatry and the triune brain. *Psychological Medicine* 15: 219-221.
1985b Brain Evolution Relating to Family, Play, and the Separation

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Call. *Archives of General Psychiatry* 42: 405-417.

1990 The Triune Brain in Evolution. Role in Paleocerebral Functions. New York: Plenum Publishing Corporation.

Mandell A. J.

1980 Toward a Psychobiology of Transcendence: God in the Brain. In: Davidson & Davidson (eds), The Psychobiology of Consciousness. New York: Plenum Press.

Maser J.D. & G. G. Gallup

1990 Theism as a By-Product of Natural Selection. *The Journal of Religion* 70 (4): 515-532.

Mehlman P. T., J. D. Higley, I. Faucher, A. A. Lilly, D. M. Taub, J. Vickers, S.J. Suomi, M. Linnoila

1994 Low CSF 5-HIAA Concentrations and Severe Aggression and Impaired Impulse Control in Nonhuman Primates. *American Journal of Psychiatry* 151 (10): 1485-91.

Morris D.

1967 The Naked Ape. London: Jonathan Cape. (1994, London: Vintage Books/Random House).

Niewenhuys R., H. J. ten Donkelaar & C. Nicholson (eds.)

1998 The Central Nervous System of Vertebrates. Berlin: Springer-Verlag

Pickford M. & B. Chiarelli (eds.)

1986 Sexual dimorfism in living and fossil primates. Firenze: Il Sedicesimo.

Plavcan J.M. & C. P. van Schaik

1992 Intrasexual competition and canine dimorphism in anthropoid primates. *American Journal of Physical Anthropology* 87: 461-477.

1994 Canine Dimorphism. *Evolutionary Anthropology* 2: 208-214.

1997 Interpreting hominid behavior on the basis of sexual dimorphism. *Journal of Human Evolution* 32: 345-374.

Raleigh M.J., G. Brammer, A. Yuwiler, J. W. Flammery, M. T. McGuire, E. Geller

1980 Serotonergic influences on the social behavior of vervet monkeys (*Cercopithecus aethiops sabaeus*). *Experimental Neurology* 68 (2): 322- 34.

Raleigh M.J., M. T. McGuire, , G. L. Brammer, D. B. Pollack and A. Yuwiler

1991 Serotonergic mechanisms promote dominance acquisition in adult male vervet monkeys. *Brain Research* 599: 181-190.

Rapoport J. L.

1989 The Biology of Obsessions and Compulsions. *Scientific American* 260 (3): 62-69.

Spinoza B.

(posthumous; written: ante 1677). Epistularum liber, XIX.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

(Correspondence, Wolf A. ed., F. Cass).

ten Donkelaar H. J.
1998 Reptiles. In: R.. Niewenhuys *et al.* (eds.), pp. 1315-1524.

Viola S.
1997 La storia senza fine dei massacri balcanici. *La Repubblica*, May 26.

Voogd J., R. Niewenhuys, P. A. M. van Dongen and H. J. ten Donkelaar
1998 Mammals. In: R. Niewenhuys *et al.* (eds.), pp. 1636-2097.

Weiger W. A.
1997 Serotonergic modulation of behaviour: a phylogenetic overview. *Biological reviews of the Cambridge Philosophical Society* 72: 61-95.

Wolters J. G., H. J. ten Donkelaar, H. W. M. Steinbusch, A. A. J. Verhofstad
1985 Distribution of serotonin in the brain stem and spinal cord of the lizard Varanus exanthematicus: an immunohistochemical study. *Neuroscience* 14: 169-193.

Wood B.
1994 The oldest hominid yet. *Nature* 371: 280-1.

Yokogoshi H. & R. J. Wurtman
1986 Meal Composition and Plasma Amino Acid Ratios: effects of Various Protein or Carbohydrates, and Various Protein Concentrations. *Metabolism* 35 (9): 837-842.

Sources of Figures

Fig. 1: modified from: MacLean P. D., 1990. The Triune Brain in Evolution. Role in Paleocerebral Functions (fig. 2-1, p. 9). New York: Plenum Publishing Corporation.
Fig. 2: P. D. MacLean, 1990. The Triune Brain in Evolution. Role in Paleocerebral Functions (fig. 4-1, p. 34). New York: Plenum Publishing Corporation.
Fig. 3: Cranial profiles from: Eldredge N. & I. Tattersall, 1982. The Myths of Human Evolution (fig. 15). New York: Columbia University Press.
Fig. 4: original model applied to fig. 1.
Fig. 5a: modified from: Jacobs B. L. & E. C. Azmitia, 1992. Structure and Function of the Brain Serotonin System. *Physiological Reviews* 72 (1): 165-229 (fig. 3, p. 172).
Fig. 5b: Kandel E.R., J. H. Schwartz & T. M. Jessel, 1991. Principles of Neural Sciences (3rd Edition; fig.56-3 b).

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The Great Sex Divide

Glenn Wilson
Institute of Psychiatry, University of London

Contents

Sex and Evolution
Evidence from Human Biology
Evidence from Animal and Other Cultures
Can the Differences be Suppressed?
Sexual Anomalies and Difficulties
Talent and Achievement
Aggression and Crime
Social Forces and the Sex War

The author examines the accumulated evidence for innate psychological differences between men and women, with direct relevance to current feminist philosophies.

ISBN 1-878465-04-X
Paperback, 160 pages
Bibliographical References and Index
Price: $20.00 Visa and MasterCard Accepted
Tel: (202) 371-2700 Fax: (202) 371-1523

Scott-Townsend Publishers
P.O. Box 34070, N.W. Washington, D.C. 20043

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Music and Peak Experiences: An Empirical Study

Michael J. Lowis[1]
Nene University College, Northampton, U.K.

Anomalous experiences, such as inner voices or moments of revelation, have been reported from the earliest of times, and music has often been associated with them. Tapes of music were played on two occasions to 74 individual members of college staff who had previously completed questionnaires on their histories of peak experiences, based on the descriptions of Maslow, and the associated antecedents. By pressing a button synchronized to the music, some 77% of participants indicated that at least one significant experience had occurred to them during the sessions. Significantly more reports occurred with upbeat music than was the case with gentle music. Thoughts and feelings evoked by the music were noted on post-test questionnaires: some indicated strong emotional reactions or mystical images, the more so with the upbeat music. Although association of the music with previous events may have been partly responsible for the participant responses, arousal theory also appeared to be implicated in the reactions. Whether or not such strong affective responses can be brought about in the listener simply through manipulation of a composition, is contrasted with the notion that music may have inherent emotional qualities.

KEYWORDS: Peak experiences, Altered states of consciousness, Music, Arousal, Evoked memories

Anomalous, subjective experiences have probably occurred to humans from the dawn of history, and reports of such have appeared in early texts such as those of both Eastern and Western religions dating back to about 1,000 B.C. Liester (1996), in a review of just one example – inner voices, mentioned that Socrates (c.470-399 B.C.) heard voices throughout his life, and that ancient Egyptians and

[1] I am grateful to the following people: Colin Touchin for advice on musical matters and for selecting the experimental music, Mike Aldridge for constructing the button device and writing the software, and Peggy Baylis for assistance with data collection. Address correspondence to Dr Mike Lowis, Department of Psychology, Nene - University College Northampton, Northampton, NN2 7AL, England. E-mail mike.lowis@nene.ac.uk

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Romans believed guiding voices originated from the gods.

In the early 1960s, Abraham Maslow, in his desire to investigate the psychology of health, made a study of the finest specimens of humankind he could find. He discovered that such individuals ("self-actualizers") *inter alia* tended to report profound experiences variously described as: moments of great awe, a feeling of oneness with the world, seeing the ultimate truth, the definitive satisfaction of vague, unsatisfied yearnings, stepping into heaven, getting lost in the present, or being detached from time and place (Maslow, 1962; 1971). Although originally thinking of such events as "mystical", Maslow came to the conclusion that in general they had little to do with religion – "at least in the supernaturalist sense" (Maslow, 1962, p.10). He came to regard them as natural, referring to them as "peak experiences".

Definitions of what constitutes a peak experience have broadened somewhat since Maslow's earlier reports. Kokoszka (1992) compiled a typology , subsumed under the heading of "altered states of consciousness", defining these in terms of what represents a sufficient deviation from general norms for that individual during alert, waking consciousness. MacDonald, Le Clair, Holland, Alter and Friedman (1995) noted that such events can probably only be truly understood through direct experience. They are, in fact, unshared sensory experiences (Stevenson, in Liester, 1996). Robinson (in Hay, 1990) stated that they have a quality that is self-authenticating: if a person has experienced a significant event, then that event is very real to him or her – "sociologically real" (Giesler, 1996). MacDonald et al (1995) concluded from their studies with a Peak Experiences Scale that, although such experiences involve positive affect, they are primarily cognitive events.

Whatever their origin, evidence suggests that peak experiences are not rare. Maslow (1962), whilst believing that few people were likely to achieve high levels of self-actualization, nevertheless suspected that peak experiences occurred in practically everybody although are not always recognized as such. Hay (1990) conducted three surveys in the United Kingdom, asking his participants if they had ever been aware of, or influenced by, a presence or power, whether one called it God or not. Affirmative responses were received from 36 to 65% of his samples. In a similar study by Greeley

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

(in Hay, 1990) carried out in the USA, 35% of respondents answered positively. Kokoszka (1992) cited incidences of 9.8 to 39% for hallucinations (mostly auditory) and 40% for experiences of unusual joyful emotion (Australian adults), 50% for contact with the sacred and 82% for experience of the beauty of nature (San Francisco residents), and 25% for a mystical feeling of oneness with the universe (Canadian students).

In an earlier phase of the present study, I set staff members of a university college two questions. The first asked if there had ever been an experience where they were so totally engrossed in performing some task, that they were unaware of any distraction or normal bodily feeling (designated the 'active' condition). The second referred to experiences where they were relaxing, listening, thinking, or meditating where they felt a heightened sense of clarity, reality, revelation, solution, or totally enveloping joy (the 'passive' condition). The findings revealed that some 85% of the 364 respondents admitted to at least one experience as defined, for either the active or passive condition, and nearly 65% for both. However, due to a relatively low survey response rate, it could only be concluded that the affirmative response for any condition lay between 31 and 85%.

With regard to what could bring about a peak experience, Maslow (1962) initially suggested aesthetic stimuli, particularly music, great moments of love and sex, bursts of creativeness and discovery, natural childbirth, fusion with nature, and athletic episodes. He later added psychedelic drugs – but only under certain circumstances (Maslow, 1964) and mathematics, particularly the act of obtaining mathematical proof (Maslow, 1971). Hardy (1979), in an analysis of the first 3,000 reports he had received on experiences of the presence of a power, whether called God or not, found the most frequent antecedents to be depression and despair, prayer or meditation, and natural beauty. Music was implicated in 5.7% of the reports. Greeley's survey (in Hay, 1990) showed music to be the most frequent trigger, being cited by 49% of respondents. Csikzentmihalyi (1975) named the activities of being creative, problem solving, being competitive, and relaxing including whilst listening to good music, as being likely to result in what he termed a "flow" experience.

My survey of college staff showed that playing a musical instrument was cited by 11.8% of respondents as an antecedent of

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

peak experiences during the active condition, whilst 55.1% of those in the passive state were linked to music listening. With all results combined, music was ranked overall first as a trigger for peak experiences as defined in the questionnaire.

Why should music be so frequently implicated in reports of unusual, subjective experiences? Trehub, Trainor and Unyk (1993) stated that music is found in every culture and historical period, and the discovery of bone flutes dating back some 27,000 years (*Guinness Book of Records*, 1994) or even to 43,000 - 67,000 years (*The Times*, U.K., 5th April 1997) lends support to this. Music is a non-verbal form of communication, and Storr (1993) speculated that it may have originated in verbal exchanges between mothers and babies, or sounds of excited speech, or even have preceded the spoken word as such. Research has shown that babies as young as one to five days could distinguish pitches with as little a difference as 50Hz (Shuter-Dyson & Gabriel, 1981), and by four months could respond to changes in melodic contour and harmony (Trehub & Trainor, 1993; Zentner & Kagan, 1996). Sloboda (1996) noted that, on average, musical capacities are displayed in infants earlier than are linguistic ones.

There has been much debate on whether or not music can communicate emotions to the listener and, if so, whether this could be due to inherent characteristics of the piece or, alternatively, deliberate compositional techniques. The composer Stravinsky stated that music is powerless to impart emotions, and any indications to the contrary are simply illusions (Cooke, 1959). Hindemith, another composer and performer, said that melodies can be constructed rationally, making use of experience that indicates which musical patterns correspond with specific emotional reactions within the listener (Cooke, 1959). Although Cooke himself disagrees, believing rather that a piece can convey the subjective experience of the composer, he nevertheless provides much detail on the role of specific chords, keys, intervals and phrases in expressing emotions. Some of the more basic musical technicalities were mentioned by Shuter-Dyson and Gabriel (1981), including major modes (happy), minor modes (sad), slow tempi (dignity and calm), fast tempi (happy and exciting), high pitches (sprightly and humorous), and low pitches (sad and dignified).

A view popular among researchers into the effects of music is

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

that emotional response occurs because of association of the piece with a previous event. Meyer (1956) believed that many affective experiences attributed to music may be the products of image processes – either personal or for the culture to which the listener belongs. Examples include a piece that reminds the listener of a previous painful event, in which case the music will cause sadness, and organ music which tends to be associated with church and thus reminds the listener of previous religious occasions. As Meyer emphasizes, such associations are extramusical, and bear no necessary connection to the structure of the composition.

Trehub and Schellenberg (1995) agree that musical sounds, by virtue of particular timbres, styles, and tunes, may evoke significant memories and associated emotions. Research has shown that under appropriate conditions music is effective in stimulating imagery, and intensifying the accompanying emotions (Saperston, 1995). In fact Goldberg (1995) found that music triggered peak experiences in Guided Imagery experiments using the Bonny method. Waterman (1996) differentiates between explicit effects in memory, where the individual is aware of the context where a piece was previously heard, and implicit effects where there is a lack of awareness of earlier circumstances even though the listener is still being influenced by them.

The thesis outlined above could not of course explain a strong emotional response to music on first hearing. In an attempt to understand such cases, as well as instances of repeated exposures, researchers have drawn on the established theory of arousal. Berlyn (1969; 1971) suggested that the relationship between complexity of an art form and what in he originally called exploration time, and later hedonic value, could be expressed in terms of an inverted-U curve. Thus in terms of music, listening pleasure increases as the musical form becomes more complex, only to reduce if the complexity increases beyond an optimal level – which presumably differs inter alia according to the listener's level of musical sophistication and training (North & Hargreaves, 1996). Berlyn (1971) added that novelty, surprisingness and ambiguity also cause arousal. Trehub and Schellenberg (1995) take this idea further with their notion of music mirroring human experience in terms of tensions and resolutions – the ebb and flow of feeling.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Sloboda (1991) conducted research into aspects of musical structure that caused strong emotional responses. In a survey of musically-involved individuals, he found that tears or lump in the throat tended to be provoked by melodic appogiaturas, shivers or goose pimples by relatively sudden changes in harmony, and racing heart or stomach sensations by acceleration and syncopation. He considered that these physical manifestations are part of the innate autonomic response system, and are not learned. From an investigation specifically related to tension and relaxation, Krumhansl (1996) concluded that musical meaning and emotion were determined by expectations conditioned by pattern perception and learned stylistic habits – an idea originally proposed by Meyer (1956). Krumhansl's participants continuously self-rated perceived tension whilst listening to a Mozart piano sonata. Tension was found to be strong at the ends of musical sections, during increases in loudness, harmonic dissonance, denial of intraopus style, chromaticism, breaks in patterns of harmony, and aspects of melodic contour.

Despite research which attempts (apparently successfully) to follow the structuralist – even atomistic, approach and point to details of musical compositions that may cause particular emotional responses in the listener, aesthetic appeal of any art form, including music, retains an element of mystery. James (1993) stated that a Mozart symphony, rather than telling us about joy, creates joy, and that music and the soul are both aspects of the external - a transcendent experience.

The composer makes his or her contribution to the emotionality of the musical piece, whether by the deliberate use of technical devices as mentioned earlier or by simply reflecting his/her own feelings oblivious of what may be later identified as musical contrivances. Sloboda (1998a) believed that musically generated affective states are not all simply triggered through association, but that the music has some inherent characteristics which promote such responses. After the composer comes the performer: how much of the response to a hearing is determined by him or her? Sloboda (1991) stated that a performer may consciously feel or know that a piece must be played in a certain way, yet cannot say why. Later, he presented the example of a professional performer who subtly manipulated tempi and dynamics, not explicitly indicated in the score,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

to positive acclaim (Sloboda, 1998c). However, to once again adopt the atomistic view does little to confirm whether such manipulation is instinctive or deliberate.

The final link in the chain is the listener. In addition to whatever skills may be innate, there will be wide variations in levels of musical training and listening sophistication. These in turn influence the will and focus of an individual which, claimed McAdams (1984), both play an important role in the perception of music. It has been suggested that musically sophisticated listeners perceive and process what they hear in a more mentally involved way than do their naive counterparts (Lerdahl & Jackendoff, 1983; Storr, 1993). North and Hargreaves (1996) noted that formal musical training tends to be associated with increased liking for more complex musical styles, whilst Waterman (1996) found that musically trained participants recorded more comments related to their own actions and abilities (e.g. "I ought to like this") and to intellectual critique (e.g. "It's a baroque string concerto of course") than did untrained participants. Sloboda (1998b) summarized the situation of the listener; commenting that music can suggest a general emotion, but our own subconscious desires, memories, and preoccupations rise to flesh this out.

In an on-going study it was previously found that level of musical involvement, as assessed by importance of music in life and time spent listening to music, was positively correlated with incidences of peak experiences involving musical triggers. Also, high level of musical involvement were found to be associated with an increased frequency of reactions relating to strong emotions as well as to a detached analysis of the music. The present phase of the study was designed to involve the same participants in controlled musical listening trials, to see if peak experiences could be stimulated under experimental conditions and, if so, what other factors might be involved.

The study was guided by a number of hypotheses. First, I supposed that strong reactions to the experimental music would be influenced by the frequency of peak experiences previously reported by the participants. Second, I adopted the view that there would be significant differences between gentle and more robust music, with regard to the number of peaks experienced and also the nature of the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

evoked feelings that were reported. I also hypothesized that familiarity with, and enjoyment of the music would significantly increase the frequency of peaks experienced during the trials, and that regular listening to radio broadcasts of classical music would result in familiarity with the stimulus pieces. Finally, I expected that participants who were already highly involved with music would react more strongly to the pieces, than would the less musically involved.

METHOD

Participants

The 74 participants who responded to invitations to take part in these experiments were part of an original pool of 364 staff members of a British university college. I considered that the original group were reasonably representative of the national population as regards age, gender and marital status, but that there was a marked bias in favor of educational level, especially involving higher university degrees. The individuals who agreed to participate in this phase were 41 (55.4%) women and 33 men. Those living with spouse or partner comprised 63.5%, with 23.0% being single, 10.8% divorced or separated, and 2.7% widowed. One participant was under 21 years of age, 11 were 21-30 years, 21 were 31-40 years, 29 were 41-50 years, 11 were 51-60 years, and one 61-70 years. Forty-two per cent had achieved educational levels below bachelor degree, including 5% with no school leaving certificate; the remainder possessed university degrees at bachelor or higher level. The participant demographic profile thus remained broadly similar to that of the original pool.

I knew from an earlier phase of the study that 93.2% of the present group had admitted to at least one peak experience (usually several): 67.6% whilst either playing or listening to music. Where relevant, other data from the earlier studies will be included in the results presented in this report.

Musical selections

Two audio tapes of pre-recorded classical music were prepared using high quality tapes and equipment. One selection was designated 'gentle' and the other 'upbeat'. The choice of pieces was inevitably subjective, but they were regarded by the professional musician who collaborated in this process as having the power to elicit emotional

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

reactions in some individuals. The rationale for the playing order was to try and maintain interest and variety, create a suitable blend and a coherent program whilst, at the same time, incorporating a thread of development of intensity and directness of expression. Current "popular" items were intentionally excluded. The gentle selection started with a piece by Elgar, and the upbeat selection commenced with an uplifting and stirring Wagnerian item which was intended to set the tone for the rest of the tape. Where possible, complete short passages were used but, if these exceeded about five minutes duration, they were carefully faded at suitable moments. Particular versions of the pieces were chosen which were regarded as being of high aesthetic excellence.

The items were:

(1) Gentle selection

a) ELGAR. "Nimrod" from Enigma Variations. London PO (Mackerras). 4'13"

b) MOZART. Adagio from "Serenade for 13 Wind Instruments". Wind Soloists of Orchestra of Age of Enlightenment (Halstead). 5'04"

c) RODRIGO. "Guitar Concerto", 2nd movement, opening. Gerald Garcia, Slovak State PO (Breiner). 4'48"

d) SCHUBERT. "String Quintet", 2nd movement, opening. Emerson String Quartet and Rostropovich. 5'11"

e) MAHLER. Adagietto from "Symphony No. 5", opening. Berlin PO (Abbado). 3'30"

f) RACHMANINOV. End, 2nd movement, "2nd Piano Concerto". Rachmaninov, Philadelphia (Stokowski). 2'41"

(2) Upbeat Selection

a) WAGNER. "The Ride of the Valkyries", end. London PO (Boult). 2'50"

b) BACH. "Brandenburg Concerto No.3", end 1st movement. Academy of St. Martin-in-the-Field (Marriner). 2'20"

c) COPELAND. "Fanfare for the Common Man". Mexico City PO (Batiz). 3'40"

d) MENDELSSOHN. "Overture Fingal's Cave", opening. Berlin PO (von Karajan). 3'49"

e) JANACEK. "Sinfonietta", 1st movement. Philharmonia (Rattle). 2'16"

f) SIBELIUS. "Symphony No.2", 4th movement ending. BBC Scottish SO

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

(Maksymiuk). 4'40"
g) SHOSTAKOVICH. "Symphony No.10", 2nd movement. Philharmonia (Rattle). 4'15"
h) RACHMANINOV. "Piano Concerto No.3", ending. Rachmaninov, Philadelphia (Ormandy). 3'25"
i) STRAVINSKY. "The Firebird ballet suite", ending. Chicago SO (Boulez). 3'45"

Prior to the commencement of the music, instructions were recorded which explained that 25 or 30 minutes of music would be heard which varied in volume, but that no adjustment to the controls would be made. The use of a hand-held button (see below) was then explained, which was to be pressed if a moment of particularly deep and profound pleasure or joy had been experienced - the sort that produces a tingle in the spine. Further definitions of such possible experiences were given in terms of total absorption, being oblivious of present surroundings, seeming to be in another world, flash of insight, revelation or heightened sense of clarity (after Maslow and others). I emphasized that some people may not wish to press the button at all, and that it must not be pressed if the music was found to be just "normally" good or enjoyable.

The message ended with a request to the participants to sit comfortably, relax, breath deeply; and close the if desired. Later, it was added that, once the music was complete, the participant should complete a questionnaire.

Response button

A comfortable, hand-held button device was created from a computer games joystick, so that pressing the top button with the thumb sent a pulse into an IBM compatible computer. The software program was custom written to register the pulses as times elapsed from a pre-determined zero point, which was set by the start of the music tape.

Post-test measure

Participants were asked to respond to questions on generally how familiar they were with the musical selections (four options: very familiar to unfamiliar), how much the music was enjoyed (greatly to

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

not at all), whether or not any of the pieces reminded them of a significant occasion in their life, and if they listened to one of the two classical music radio programs (yes/no, and how often). An open question asked for descriptions of any thoughts or feelings that came to mind whilst listening to the music.

Finally, there was a 5-point rating scale (great deal through to none) for 13 types of feeling the music may have evoked, these being: rest/quiet, sadness, joy, love/tenderness, longing, amusement, dignity/stateliness, patriotism, reverence/spirituality, disgust, action, boredom, and memory/thoughtfulness. This scale was adapted from that devised by Gatewood (1927) for her study into the nature of human enjoyment, and had previously been used by Lowis and Hughes (1997) in their investigation into the effects of sacred and secular music on elderly people.

Procedure

The participants were seen individually, by appointment during working hours, on two occasions. Due to attrition, only 66 of the initial 74 volunteers completed both assignments. A sound-attenuated room, measuring approximately 3 by 4 meters, was reserved for the experiments. It was carpeted and windowless, but with a positive air flow ventilation system which was relatively unobtrusive. An easy chair with cushion was placed against one of the long walls, and two high quality (Goodman) speakers were set on tables with cloths against the opposite wall, to form a triangle with the chair. The high quality tape deck (Pioneer) with seven-channel graphic equalizers for each stereo output, plus amplifier (Teac), were placed to the left of the chair out of the line of sight. An IBM compatible desk-top computer was positioned on a table to the left, with the screen out of the line of sight. The response button, linked to the computer with a two-meter cable, was placed on the arm of the chair. Efforts were made to eliminate unsightly or distracting objects, and to create as much as possible a natural home type of environment; a pot plant was placed between the speakers.

The participants were invited to make themselves comfortable in the chair, the operation of the response button (to be held in the dominant hand) explained, and the location of the post-test questionnaire pointed out. Remaining instructions were contained on

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

the tape. When the participant appeared to be settled, the tape and computer program were started simultaneously. The researcher then dimmed the lights to a pre-set level and left the room. Controls on the audio equipment were pre-set so that the quietest sounds were audible and the crescendos just reached the safe loudness limit as shown on the amplifier output displays. When the tape had finished and the questionnaire completed, the participant left the room and was met by the researcher for a short, informal debriefing.

The mean elapsed time between the two sessions for each participant was 65 days (standard deviation = 13.0), with a range of 42 to 98 days. The order of presentation of the two tapes was alternated so that half the participants heard the gentle selection first and half the upbeat. Informal comments received from the participants were generally favorable, often mentioning how pleasant it was to escape a busy work routine, but a very small number complained that the music was loud and not enjoyable.

Data from the button pressings and the post-test questionnaires were entered onto a computerized data base (along with data obtained from earlier surveys with the same participants), and analyzed with the aid of the software Statistical Package for the Social Sciences, release 6.0.1 (SPAS Inc., 444 North Michigan Avenue, Chicago, IL 60611, USA).

RESULTS

Music selections and button pressing

For the gentle music selection, I found that 67.6% of participants pressed the button at least once, and for the upbeat tape the figure was 62.9% (N = 71). Participants who failed to press the button at all for either selection comprised 22.7% of the total (N = 66). The maximum number of pressings by any one participant was 42 for the upbeat selection and 30 for the gentle.

I found no significant correlations between frequency of button pressings (either tape, or both combined) and the demographic variables of age, marital status, or educational level, and no differences in this regard relating to gender. Although I observed a trend that the button was pressed more frequently when a particular music selection was heard at the first session, compared with the second, this did not prove to be statistically significant ($t = 1.44$, $p =$

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

.153). Note that all significance levels are two-tailed unless otherwise stated.

In view of these findings, further analyses were accomplished using the combined results for each tape respectively. A comparison of mean button pressings revealed that the upbeat music resulted in significantly more responses than did the gentle music (mean upbeat = 7.20, mean gentle = 3.81, t = 2.53, p = .014, N = 70).

Influences on button pressing

With each music selection respectively, I obtained the following significant and positive Pearson product moment correlation coefficients:

> *Gentle music*: familiarity and enjoyment (r = .461, p = .000); familiarity and button pressing (r = .267, p = .026); enjoyment and button pressing (r = .281, p = .018).
> *Upbeat music*: familiarity and enjoyment (r = .367, p = .002); familiarity and button pressing (r = .249, p = .038); enjoyment and button pressing (r = .256, p = .034).

I also obtained significant correlations between listening to classical music on the radio and enjoyment of the gentle selection (r = .458, p = .000) and familiarity with the pieces (r = .536, p = .000), but this was not the case with the upbeat selection. With regard to frequency of button pressing for the gentle selection, there was a modest significant one-tail correlation between this and listening to the radio (r = .213, p = .037), but again this was not the case with the upbeat selection.

Previous peak experiences

I tested the relationships between the present results, and previous data from the same participants on frequencies and antecedents of peak experiences. I found a significant correlation between frequency of previous peak experiences under active and passive conditions combined, and the present incidences of button pressing (r = .286, p = .020, N = 66). For the specific passive trigger of listening to music, I also found a significant link (r = .376, p = .002), but this was not the case with the active trigger of playing

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a musical instrument.

Evoked feelings and previous occasions

For both the gentle and upbeat music selections, I found significant, positive correlations between frequency of button pressings and participant ratings for the following feelings evoked by the music:

joy (gentle: $r = .453$, $p = .000$; upbeat: $r = .418$, $p = .000$), love/tenderness (gentle: $r = .490$, $p = .000$; upbeat: $r = .374$, $p = .001$), longing (gentle: $r = .472$, $p = .000$; upbeat: $r = .261$, $p = .029$).

Additionally, for the upbeat selection only, I obtained significant relationships with the following additional evoked feelings: sadness ($r = .427$, $p = .000$), reverence/spirituality ($r = .444$, $p = .000$), action ($r = .250$, $p = .037$), memory/thoughtfulness ($r = .352$, $p = .003$).

Although 65.6% of participants responded "yes" to the item on whether or not the music had reminded them of a specific previous occasion or event, I found no significant links between this response and frequency of button pressings.

Free response comments

Comments were made on approximately 80% of the documents. In 71% of the cases with gentle music and 52% with upbeat, references were made to communion with nature or memories of earlier occasions or events, often in childhood and usually happy although sometimes serious or sad (e.g. war; funerals). Mountains or sea featured more with reference to the upbeat music, and peace, longing, relaxation and holidays more with the gentle selection.

Strong emotions or mystical events were cited in 23% of the cases for upbeat music, and 11% for gentle. With the former, some participants mentioned knots in the stomach, tears, shivers, thrills, the mystique of other worlds, the dawn of time, futuristic events, or pictures in the mind. For the gentle music there were comments referring to soaring above the countryside, tears, lump in the throat, and visions. There was a tendency for these more extreme comments

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

to originate from participants who pressed the button frequently (20 of above) during a listening session, but the data were not suitable for a more quantitative analyses.

DISCUSSION

In summary, my main findings from this study are that some 77% of participants considered they had experienced at least one peak event, but that the incidence of these was significantly higher for the upbeat tape. For both selections I obtained significant and positive correlations between familiarity of the music, enjoyment of it, frequency of button pressing and, for the gentle music only, between these variables and listening to classical music on the radio. There were also significant links between frequency of button pressing and earlier reported incidences of peak experiences in general, and of listening to music in particular. A wider range of evoked feelings were linked to frequency of button pressing for the upbeat music than for the gentle, and there was a trend for strong emotional responses or mystical events to be associated mostly (but not exclusively) with the upbeat music.

If these findings are to have any degree of validity, there needs to be confidence that pressing the button at a particular point in the music did, in fact signify a peak experience and not just something "good" or enjoyable. Such experiences are of course subjective and not amenable to objective study. Also, the demand characteristics of the situation might encourage participants to press the button inappropriately. Attempts to minimize this rested largely with the standard instructions at the start of each tape, which emphasized terms such as tingles, total absorption, being in another world, revelation and heightened sense of clarity. It was also made clear that some participants might not feel the need to press the button at all. Similar descriptions of peak events were given during a previous survey of the same individuals, therefore the participants did have some practice in making judgments on the nature of what they had experienced.

The fact that nearly 23% of participants failed to press the button once during either session confirms that there was not a wholesale desire to respond in order to create an impression or please the researcher. The temptation to formally question

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

participants immediately after button pressing was resisted at this stage in favor of maintaining a naturalistic listening situation, and providing opportunity for free responses on the post-test questionnaire. In the absence of contradictory evidence, it will be assumed that pressing the button generally indicated that the listener did have an experience which could be subsumed under the descriptions of "peak", and which was real and self-authenticating to him or her (Robinson in Hay, 1990; Giesler, 1996). However, it is not known if the intensity of an experience could, in some cases, have been strong enough to temporarily inhibit the desire, or indeed ability, to perform the act of button pressing at the relevant moment.

The finding that some 77% of participants pressed the button at least once during the music sessions compares favorably with previously reported incidences of 35 to 65% for peak experiences (Hay, 1990; Kokoszka, 1992), and my own findings of 31 to 85% for the same participant pool. The powerful ability of music to generate strong feelings in relatively large numbers of people is thus confirmed, and it is appropriate to return to the question of why this might be so.

My results indicated a relationship between familiarity with the pieces heard, enjoyment of them, and frequency of button pressing. It is of interest, however, that only with the gentle selection was regular listening to classical music broadcasts associated with each of these variables. This suggests that people tend to listen to peaceful, relaxing melodies on the radio and thus become familiar with them, rather than choose music that is more robust and arousing. However when the more upbeat selections are heard, whether by choice or chance, the frequency and strength of emotional reactions are greater. Gatewood (1927) reported a link between enjoyment of musical extracts and the strength of resulting emotional affect and Lowis and Hughes (1997), in their study on the effects of sacred and secular music on elderly subjects, obtained significant, positive correlations between enjoyment of the music and familiarity with the pieces.

Lowis and Hughes (1997) also demonstrated a link between familiarity with the selections used, and degree of musical training the participants had received. Evidence exists that such training will lead to more sophisticated forms of neurological processing, for example left hemisphere involvement, and a liking for more complex musical

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

styles (Lerdahl & Jackendoff, 1983; Storr, 1993). Smeijsters (1995) found that music students were more likely to describe music in terms such as it made them cry, promotes solidarity with others, and enables them to discover their own emotions in the music. By contrast, business student controls often selected statements relating to singing, whistling, moving or dancing. Waterman's (1996) finding that musically trained participants tended to describe their cognitions with referents which were self-oriented or intellectual would concur. With my original participant pool, I obtained broadly similar results, with those showing the highest levels of musical involvement often selecting emotional statements such as: "I can feel it in my stomach"; "it is like I am addicted"; as well as analytical comments such as "I pay attention to whether the piece is well performed"; and "I follow the melody and rhythm".

Although some 66% of participants answered "yes" to the post-test question on whether or not the music had reminded them of a previous occasion or event, the study did not find a significant difference in frequency of button pressing between those who responded positively or negatively to this question. Present support for the notion that strong reactions to music is due to the pieces being associated with a previous event which was itself emotionally-charged (e.g. Meyer, 1956; Trehub & Schellenberg, 1995; Saperston, 1995) is therefore mixed. More promising would be Waterman's (1996) theory that such an association can be explicit or implicit. With the present participants, significant links were found between frequency of button pressing and the evoked feelings of joy, love, longing (both music selections), and also sadness, reverence, action and memory (upbeat music only). In the absence of awareness that the music reminded the listeners of specific musical events, the implication is that if associational factors were involved, then the effects were "implicit" in Waterman's terminology.

There remains, however, an alternative explanation for these findings. Rather than the correlations between frequency of button pressing and certain evoked feelings being associational, perhaps the music itself had inherent emotional qualities. If this were so, then two further possibilities present themselves: might these be due purely to the use of compositional "tricks of the trade", or could the composer let his or her true feelings flow into the music as an aesthetic

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

creation, devoid of intentional structural manipulation? It was stated earlier that composers such as Stravinsky and Hindemith come down firmly on the side of rational construction, and that even basic elements such as pitch, tempo and volume can suggest emotions to the listener (Cooke, 1959; Shuter-Dyson & Gabrial, 1981). Sloboda (1991) reported on emotional responses to, for example, appogiaturas or sudden changes of harmony, and Waterman (1996) cited others such as descending fifths and the entrance of the female voice.

The identification of features such as these does nothing to confirm that a composer selects a range of musical building blocks in a mechanical manner, but rather that these elements have been identified in a post hoc structural analysis. Such revelations do not by necessity discount the alternative notion, propounded so strongly by Cooke (1959), that music can convey the subjective experiences of the composer, and Schopenhauer (in Storr, 1991) who believed that music was directly expressive of the true, inner nature of reality. Sloboda (1998a) believed that music has some inherent characteristics which promote affective responses, which might even be at variance with the listener's personal disposition toward it.

Lowis and Hughes (1997) exposed elderly subjects to music they believed was created whilst the composer was in a spiritual state of mind, but they failed to obtain significant increases in scores on a spirituality scale. Of more interest was the finding that those participants who scored highly on the spirituality scale tended to rate both sacred and secular types of music high in spiritual feeling. The obvious conclusion was that the state of mind or disposition of the listener is a more important determinant of perceived emotionality of music, than is the music itself.

Added to whatever emotional characteristics may have been incorporated in a piece of music, an additional dimension is added by the performer. The player can try to communicate feeling through his or her own rendition, for example through tempi, dynamics, or by sheer virtuosity (Gabrielson & Juslin, 1996; Sloboda, 1991; 1998a), or reinforce the structural features s/he believes are intrinsically important. How this may be accomplished, and why aspects of composition or performance can have the effects that they do, may be related to one further finding of this study.

The upbeat musical selection resulted in significantly more peak

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

experiences, as signified by the frequency of button pressing, than did the gentle music. The obvious difference between these two selections, as suggested by the names given to them, was that one was mostly gentle and peaceful, generally had slower tempi, and contained only a few modest crescendos. The other tape contained music that was altogether more upbeat, with sweeping crescendos, lively tempi and dramatic contrasts. In a word, the latter was arousing rather than relaxing.

Meyer (1956) believed that music arouses expectations and suspense (conscious and unconscious) which may or may not be immediately satisfied; if the latter occurs then a state of tension will presumably exist. In his discussions on aspects of aesthetic performance, Berlyn (1969; 1971) depicted this in terms of the inverted-U curve, whereby pleasure in art (including music) may be given by an increase in arousal followed by a reduction. Emotional responses to significant moments in music can also have physical manifestations, for example changes in blood-pressure, respiration and pulse-rate (Storr, 1993) or tears, shivers and lumps in the throat (Sloboda, 1991). Similar reactions were reported by some of the participants in the present study.

Several writers have suggested contradicted expectations, or at least prolonging the resolution of an expectation, as being responsible for engendering emotional responses to music (Winner, 1982; Storr, 1993; Gabrielson & Juslin, 1996). Krumhansl (1996) added that such expectations are conditioned by the Gestalt principles of pattern perception and learned stylistic habits: musical meaning and emotion depend on how the music plays against these expectations.

In conclusion, the present study has confirmed that people can and do report strong emotional reactions to music and, if it is accepted that the participants were responding genuinely to the descriptions given in the instructions, then such reactions are by definition peak experiences. The precise mechanism by which music can bring about such effects is still open to debate. Association of particular music with previous events which themselves were emotional is certainly likely to bring about a similar feeling on later hearing, but this still begs the question of why that music seemed to fit the mood of the original event.

Certainly some elements of musical composition and

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

performance are known to produce emotional response, but to adopt a purely structuralist approach reduces music (or any other art form) to a matter of basic technique. Surely a gifted composer or other artist attempts to communicate the passion he or she feels from within and, if successful, the listener will share something of the same feeling. Whether the composer then deliberately selects the appropriate tools from an established repertoire, or instinctively tries to express him or herself by what later analysts identify as specific structures, appears to be less important than the genuineness of the original aesthetic intent. If this intention is indeed conveyed to the listener, then the composer has successfully achieved his or her objective. There is still much to explore on this matter.

References

Berlyn, D.E.
1969 Measures of aesthetic performance. In J.Hogg (Ed.), Psychology of the visual arts: Selected readings. Harmondsworth: Penguin.

Berlyn, D.E.
1971 Aesthetics and psychobiology. New York: Appleton-Century-Crofts.

Cook, D.
1959 The language of music. Oxford: University Press.

Csikzentmihalyi, M.
1975 Beyond boredom and anxiety. San Francisco: Jossey-Bass.

Gabrielsson, A., & Juslin, P.N.
1996 Emotional expression in music performance: Between the performer's intention and the listener's experience. Psychology of Music, 24, 68-91.

Gatewood, E.L.
1927 An experimental study of the nature of musical enjoyment. In: M. Schoen (Ed.), The effects of music. London: Kegan Paul.

Giesler, P.V.
1996 The cultural and universal search for real experiences: Critical notes on James McClenon's Wondrous events. The Journal of the American Society for Psychical Research, 90, 115-135.

Goldberg, F.S.
1995 The Bonny method of guided imagery and music. In: T. Wigram, B. Saperston, & R. West (Eds.), The art and science of music therapy: A handbook. Switzerland: Harwood.

Hardy, A.
1979 The spiritual nature of man. Oxford: Clarendon.

Hay, D.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

1990 Religious experiences today: Studying the facts. London: Mowbray.

James, J.

1993 The music of the spheres. London: Little, Brown.

Kokoszka, A.

1992 Occurrence of altered states of consciousness: An overview. Imagination, Cognition and Personality, 12(1), 89-96.

Krumhansl, C.L.

1996 A perceptual analysis of Mozart's piano sonata K.282: Segmentation, tension, and musical ideas. Music Perception, 13(3), 401-432.

Lerdahl, F., & Jackendoff, R.

1983 A generative theory of tonal music. Cambridge, Mass.: MIT Press.

Liester, M.B.

1996 Inner voices: Distinguishing transcendent and pathological characteristics. The Journal of Transpersonal Psychology, 28(1), 1-30.

Lowis, M.J., & Hughes, J.

1997 A comparison of the effects of sacred and secular music on elderly people. Journal of Psychology, 131(1), 45-55.

MacDonald, D.A., LeClair, L., Holland, C.J., Alter, A., & Friedman, H.L.

1995 A survey of measures of transpersonal constructs. The Journal of Transpersonal Psychology, 27(2), 171-231.

Maslow, A.H.

1962 Lessons from peak experiences. Journal of Humanistic Psychology,2, 9-18.

Maslow, A.H.

1971 The farther reaches of human nature. Harmonsworth: Penguin.

McAdams, S.

1984 The auditory image: A metaphor for musical and psychological research on auditory organization. In W.R. Crozier & A.J. Chapman (Eds.), Cognitive processes in the perception of art. N. Holland: Elsevier.

Meyer, L.B.

1956 Emotion and meaning in music. Chicago: University of Chicago Press.

North, A.C., & Hargreaves, D.J.

1996 Liking for music in everyday life. Paper presented at The British Association Annual Festival of Science. University of Birmingham, September, 1996.

Saperston, B.

1995 The effects of consistent tempi and physiologically interactive tempi on heart rate and EMG responses. In T. Wigram, B. Saperston and R. West (Eds.), The art and science of music therapy: A Handbook. Switzerland: Harwood.

Shuter-Dyson, R. & Gabriel, C.

1981 The psychology of musical ability (2nd ed.). London: Methuen.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Sloboda, J.A.
1991 Musical structure and emotional responses: Some empirical findings. Psychology of Music, 19, 110-120.
Sloboda, J.A.
1996 The acquisition of musical performance expertise: Deconstructingthe "talent" account of individual differences in musical activity. In K.A. Ericsson (Ed.), The road to excellence: The acquisition of expert performance in arts and sciences, sports and games. Mahwah, N.J.: Erlbquar.
Sloboda, J.A.
1998a Music and worship: A psychologist's perspective. In J. Astley, T. Hone, & M. Savage (Eds.), Music, theology, and Christian learning. Leominster: Gracewing Fowler Wright.
Sloboda, J.A.
1998b Emotional peaks in music: How composers and performers produce them, and how listeners are affected by them. Paper given at Geneva Emotion Week, May.
Sloboda, J.A.
1998c Why does music send shivers up and down the spine? Paper given at the Lichfield Music Festival, July.
Smeijsters, H.
1995 The functions of music therapy. In T. Wigram, B. Saperston, & R. West (Eds.), The art and science of music therapy: A handbook. Switzerland: Harwood.
Storr, A.
1993 Music and mind. London: HarperCollins.
Trehub, S.E., & Schellenberg, E.G.
1995 Music: Its relevance to infants. Anals of Child Development, 11, 1-24.
Trehub, S.E., & Trainor, L.J.
1993 Listening strategies in infancy: he roots of music and language development. In S. McAdams & E. Bigand (Eds.), Thinking in sound: The cognitive psychology of human audition. Oxford: University Press.
Trehub, S.E., Trainor, L.J., & Unyk, A.M.
1993 Music and speech processing in the first year of life. Advances in Child Development and Behaviour, 24, 1-35.
Waterman, M.
1996 Emotional response to music: Implicit effects in listeners and performers. Psychology of Music, 24, 53-67.
Winner, E.
1982 Invented worlds: The psychology of the arts. Cambridge, Mass.: Harvard University Press.
Zentner, M.R., & Kagan, J.
1996 Perception of music by infants. Nature, 383, 29.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Overpopulation and the Threat of Ecological Disaster: The Need for Global Bioethics

Brunetto Chiarelli
University of Florence

Nature may not be interested in the survival of humanity. *Homo sapiens* is the product of an adaptive evolution, but if the species continues to indulge in unlimited reproduction and undisciplined exploitation of the earth's resources, it may bring about its own destruction as well as the destruction of other species of animals and plants.

Key Words: Bioethics, Demography, Ecology, Environmental destruction, Overpopulation, Waste Disposal.

At the threshold of the Twenty-first Century, Humankind is facing a new Era. After 6 million years of genomic independent existence, and after 2yK of increased capacity in learning and transmitting information among the members of the group and from one generation to the next which supported an enduring technological tradition.

Following the emergence of our own species, *Homo sapiens* around 2 - 5 hundred thousand years ago in East Africa and its migration to the Eurasian continents, its physical adaptation to different environmental niches, and the development of new mental capacities due to a continuous stimulation and selection for subsistence, clothing and construction of shelters, after having domesticated plants and animals around 10-6 thousand years ago, there began a progressive and drastic reduction of natural biodiversity.

Humankind now has to face the effects of a dramatic and accelerated population growth (Fig.1). In the last two centuries human population size increased from one billion in 1835, to 2.5 billion by 1950. This number then doubled in only 45 years to almost 6 billion. This unprecedented increase in numbers, affecting specific geographical areas (tab.1), has accentuated the deterioration of the natural environment caused by the misuse of natural resources and

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

the depletion of fertile soils due to the clearance of forests, climatic changes and pollution.

Together with increased poverty and diminished access to resources, the struggle for survival has resulted in massive migration to urban areas, dramatic crises in multiethnic states, the breakdown of social relationships, and the rise of conflicts which are having a devastating effect on the lives and future of the populations involved.

It is the poorer countries which are experiencing this high level of fertility, formerly balanced by a correspondingly high death rate, and these are now the scene of extreme poverty and accompanying ecological destruction. Even apart from the harsh realities of poverty and environmental degradation, poverty and unemployment produces a surplus of frustrated, angry young people who are shamed by their continued dependency on their families. This is one of the frightening economic/demographic problems in the world, and is resulting in a rising tide of massive migratory pressures as more and more young people take sometimes incredible risks in their attempt to flee their own homelands and cross the borders into as yet more prosperous nations.

Large numbers of people require large quantities of energy and nutrition. They also produce large quantities of waste products and generally are inclined to act as an imbalancing force on the environment. Furthermore, the quality of the ecosystem is now threatened by the "green house effect," which is the direct result of a sometimes irrational industrialization. Ecological integrity is a concept that has to be advanced by anthropologists in order to facilitate the protection of the delicate balance of biological and ecological resources which make this planet habitable. Each generation makes decisions that binds humanity thereafter. Our knowledge is worthless if it cannot be the basis of future decisions!

Today, our species faces the prospect of doubling within a generation (25 years). Those who ever lived since the beginning of the Common Era (2 thousand years ago) total about 50 billion persons by comparison to about 44 billion who ever lived before that time. The world today is populated by almost 6 billion persons. This large and growing population is exerting a major pressure on natural resources. The increasing demands for marketable goods from non-renewable or fragile resources or high environmental threatens

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

us in the future. There are already indications of violence and turbulence in and outside the industrial world accompanied by an ideological crisis. The outcome will depend on our action or inaction as individuals and as associations.

The United Nations Conference on Population and Development held in Cairo on September 1994, as well the Rio Conference on Environment and Biodiversity of 1992, have stressed the urgency of facing demographic and environmental pressures on a global scale. The real problems remain the impact of population growth on food and energy resources, the problem of waste disposal, and the even more horrendous problem of pollution and environmental degradation. The conferences only touched on the surface of these problems.

Raising these issues is not enough. An holistic, specifically anthropological approach is urgently needed. As a result of this demographic and ecological impact, *Homo sapiens* appears to be the most destructive species the Earth has witnessed. In the last few decades we have witnessed a progressive and drastic reduction of natural biodiversity at the same time that Humankind is introducing new varieties or even new species with the help of genetic engineering.

It was in fact with the coming of the industrial age in the nineteenth century that man imposed his presence on Nature in a more violent way. In the Western world the collapse of Thomistic theology, followed by the development of scientism, positivism and mechanichalism of nature, led to an unconditional faith in progress, with ideological crises that also had social and political consequences such as Marxism.

Two new factors have been added to ideological changes since the first half of this century:

1) The ecological impact of Man on the environment, which began with the industrial revolution, and with the population explosion that accompanied it and the growth of medical knowledge, has become apparent during the second half of this century;

2) The innovative impact of Science, first with atomic physics, which proposed the fission of the fundamental unit of matter, the atom,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

and then with molecular biology, which has led to the decoding of genetic information and the interventions of biological engineering, destroys traditional concepts such as the individual and the species as fundamental units of life.

The human species is now beginning to consider Nature as an ambience that is capable of supporting life (Ecology) and as matter out of which humanity itself is formed, as well as all the other living organisms (Comparative Biology). Mind reflects on matter, yet mind is made of the same material as matter!

Man now also knows that he is an integral part of Nature, so that we can perhaps say that "Nature through Man thinks of herself;" hence the anthropic interaction between Man's consciousness of himself and his knowledge of Nature. This stage of fundamental rethinking is however overshadowed by the threat of ecological disaster and catastrophic population increase, which might not only impose limits to development, but could well undermine the very survival of the human species. The future survival of our species depends on the interaction between humanities' reproductive characteristics and the carrying capacity of the Earth for humans. Therefore, there is the need for a new science which, with V. R. Potter, we propose to call "Global Bioethics", that would envisage a naturalistic, evolutionist and scientific vision of ethics for life. Any such general theory for the evaluation of criteria for good and evil must adopt the same criteria as science.

In European cultural history, the first forms of ethics amounted to the relationship between individuals, the balance between individual freedom and the maintenance of good relations within a specific social group: father and mother, son and daughter, husband, wife and kinsmen.

Subsequent ethical philosophy in the Western world bore on the relationship between individuals and society, in the sense of an widely-defined group of known or unknown "fellow-citizens." This involved systems of jurisprudence, together with such concepts as democracy. Yet still there is no codification of any ethical system such as is needed to regulate the interaction between humans and earth and the animals and plants that grow on it. The relationship between humans and the things of nature, as A. Leopold (1933) writes, is still

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

strictly economic. The Earth is considered only from the ownership point of view, and all the norms that regulate the relationship between humans and the Earth imply only privileges and no obligations for humans. The extension of ethics to this third element, to the ambience utilized by humans, is an evolutionary progression and an ecological necessity. It is the third stage in a sequence through which the first two have already been passed. It is becoming increasingly urgent to follow this sequence now that the world is experiencing a serious crisis that is not only economic and ecological but involves cultural and moral values, even identity.

Ethics and Anthropology

The natural and humanistic sciences (zoology, paleontology, archaeology, ethnology, genetics and psychology) have for some time provided valuable data showing how there is no contradiction between the affirmation of the animal nature of man and his unique quality as a cultural creature. It follows therefore that our very survival may depend on achieving a more balanced and harmonious relationship with the other elements in the ecosystem. To this end it is necessary to create a bridge between the humanistic disciplines and the naturalistic ones in order to create a synthetic vision of the history of Man as natural history, in which precise scientific knowledge, and not ideological position, constitutes the basis of the relationship between humanity and the rest of the natural world.

Since ancient times, isolated thinkers from both East and West have reiterated the harm man suffers from a wrong use of the natural ambience, but until now there has been no "social awareness" of that situation.

Nature may not be interested in the survival of humanity. The present Humankind, *Homo sapiens*, is the product of an adaptive evolution. However, if humanity indulges in unlimited reproduction and undisciplined exploitation of the available resources, it may bring about its own destruction as well as the destruction of other species of animals and plants.

The days are numbered. Demographic predictions indicate that the population of the Earth will inexorably reach at least 10 billion by the year 2050 if not sooner. If all these people seek to share contemporary Western levels of consumption, disaster will ensue, and

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

it is extremely unlikely that the human species will survive to the end of the next century.

It is necessary to create a new pact between the human species and Nature to make our existence on this Planet still possible. This complex challenge, essential for the survival of Humankind, must be discussed and faced at the beginning of the third millennium!

References

AAVV

1994 *World Population Data Shaet.* Population References Bureau, Washington D.C.

Chiarelli B.

1984 *Origine della Socialita e della Cultura Umana,* Laterza, Bari.

1990 *Problemi di Bioetica nella transizione fra il I1 e III millennfo,* Il Sedicesimo, Firenze.

1993 *Bioethica Globale, A.* Pontecorboli ed., Firenze

1994 For a naturalistic definition of Bioethics, Social Biology and Human Affairs, 59:88-96

1995 *Man between Past and Future.* Institute for the Study of Man, Washington D.C.

Leopold A.S.

1933 The Conservation Ethic. *Journal of Forestry* 31:634-643

1949 *A Sand County Almanac with other Essays on Conservation,* Round River, Oxford University Press.

Potter V.R.

1971 *Bioethics: Bridge to the Future,* Englewood Cliffs, Prestige Hall.

1992 Global Bioethics as a secular source of moral authority for longterm human survival, *Global Bioethics* 5:5-11.

1992 Global Bioethics facing a world crisis, *Global Bioethics* 5:69-76.

1988 *Global Bioethics (Building on the Leopold Legacy),* Michigan State University Press.

Westra L., Lemons J.

1995 *Perspectives on Ecological Integrity.* Kluwer Academic Pub]ishers, The Nether]ands

Note: Some of these ideas will be debated at the 15th Congress of the International Union of Anthropological and Ethnological Sciences, which will be held in the year 2003 in Florence, Italy, and which will have as its general title: Humankind/Nature Interaction; Past, Present and Future. Interested attendees can contact: XV IUAES Congress Firenze 2003, via del Proconsolo 12, 50122 Firenze, Italy.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Race is More Than Just Skin Deep: A Psychologist's View

J. Philippe Rushton[1]
University of Western Ontario

This article defends the concept of "race" against a coordinated political campaign to deconstruct basic biology. It briefly reviews some of the most reliably documented Black-White differences, such as those in brain size, IQ, violent crime, testosterone, sexuality and AIDs. Although these racial differences are now reliably found worldwide (not just within the USA), many in the media and scholarly associations continue to try and deny them or attribute them to "political circumstance." "Statements on Race" made by organizations such as the American Association for Anthropology are discussed and found to be wanting.

Key Words: AAA Statement on Race, brain size, crime, evolution, intelligence.

I originally wrote this paper in reaction to a Knight-Ridder article ("Genetic Basis For Race Said To Be Just Skin Deep," October 13, 1996), which argued that race has no validity as a biological concept when applied to man, seeking to defend the concept of "race" against a coordinated political campaign to deconstruct basic biology. Since then numerous other media stories have appeared purporting to debunk the reality of race, some playing off policy statements by scholarly organizations such as the one adopted by the American Association of Anthropology on May 17, 1998. Worse, governments have become actively involved in propagating the misinformation.

I originally wrote this paper in reaction to a Knight-Ridder article ("Genetic Basis For Race Said To Be Just Skin Deep,"

[1] J. Philippe Rushton, Department of Psychology, University of Western Ontario, London, Ontario N6A 5C2 Canada

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

October 13, 1996), which argued that race has no validity as a biological concept when applied to man. I disseminated the paper on the Internet and elsewhere, seeking to defend the concept of "race" against a coordinated political campaign to deconstruct basic biology. Since then numerous other media stories have appeared purporting to debunk the reality of race, some playing off policy statements made by scholarly organizations. Worse, governments have become actively involved in propagating the misinformation.

The most recent example of a policy statement on race by a scholarly organization is the one adopted by the American Association of Anthropology on May 17, 1998 (to be discussed further below). Yet the AAA Statement on Race is empirically false when it argues that "physical variations in the human species have no meaning except the social ones that humans put on them" and that any observed group differences are the result of social conditioning and "political circumstance" (September 1998 *Anthropolgy Newsletter*, p. 3). To take one relevant example, consider the relationship between brain size and intelligence.

During the 19th century, physical anthropologists found that Blacks averaged smaller brains than Whites. Whether measuring the weight of the brain or the size of the cranial cavity, they consistently found a difference equivalent to about 100 cubic centimeters. The difference was well documented as early as the 1840s by the "American school" of anthropology, which included Samuel G. Morton, Joshiah C. Nott, and George R. Glidden. It was corroborated from the 1860s to the 1890s by European anthropologists, such as Paul Broca and Paul Topinard in France, who compared Blacks and Whites from Africa and Europe. Broca (1873) wrote: "West Africans have a cranial capacity about 100 cm^3 less than the European races."

The data on race differences in brain size were so widely known that Charles Darwin (1871) was able to cite them as evidence in favor of his then controversial theory of human evolution in *The Descent of Man*. Even Franz Boas, who is often described as the "real" founder of American anthropology and the first to challenge "Eurocentric racism," added further knowledge about brain size and race by emphasizing the amount of overlap in the distributions. On a visit to England in 1889, Boas had became acquainted with Sir Francis

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Galton's work on biometrics and, in his 1894 article "Human Faculty Determined by Race," pointed out that Topinard's measurements revealed that 27 percent of Blacks exceeded the White average. His inference: "We might, therefore, anticipate a lack of men of high genius (among Blacks)." And, he wrote, "It would seem that the greater the central nervous system, the higher the faculty of the race and the greater its aptitude to mental development."

In 1910, Boas again acknowledged that the "average" Black brain was "smaller than that of other races." Remarkably, Boas published this in *Crisis*, the organ of the National Association for the Advancement of Colored People (NAACP). Boas wrote "We may, therefore, expect less average ability and also, on account of probable anatomical differences, somewhat different mental tendencies." These early works were enlarged in his 1911 book, *The Mind of Primitive Man*.

To the modern eye it is astounding to see these data discussed so openly, and from scientists with such diverse viewpoints. Some were sympathetic to slavery (Nott and Glidden), some were anti-evolutionists (Morton), others in favor of evolution (Broca, Topinard), and some avowedly pro-Black and anti-racist (Boas). Unfortunately, today, the data can scarcely be mentioned in polite society, or even at scientific meetings.

In recent times, what I have dubbed the "hermeneuticist" perspective has so come to dominate anthropology that it has effectively removed the topic from the social scientific radar screen. Hermeneuticists approach race, brain size, and IQ, as epiphenomena, mere social constructions (Rushton, 1997c). They argue that political, economic, and even linguistic forces are the real causal agents that have created the concepts of "race" and "IQ" and deemed them worthy of study. Rather than research race, hermeneuticists research those who do. The current popularity of the hermeneuticist position might best be demonstrated using some vivid examples.

Deconstructing Race

"Race is a fiction, Racism is real" proclaimed the August 1998 placards on the Metro buses of Washington, D.C. The D.C. government is not alone in spending taxpayers money in the crusade against race. A 1995 campaign against racism by the British

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Commission for Racial Equality featured a slick Madison Avenue-like poster of four brains. Three of the brains are the same size and are labeled "African," "Asian," and "European." The fourth brain, much smaller than the others, is labeled "Racist." Because there are, in fact, significant differences between the races in average brain size (see below), the poster campaign by the Commission for Racial Equality constitutes state-sponsored misinformation.

The government campaigns are based on policy statements made by professional bodies. A resolution denouncing racism at the 1938 meeting of the American Anthropological Association broke the mold to the idea that scientific societies should be apolitical (Degler, 1991, p. 203). Ideological resolutions began in earnest with the 1952 "Statement on Race" issued by 14 anthropologists and geneticists under the auspices of UNESCO (Comas, 1961). Since then, several endorsements and modifications to the 1952 Statement have appeared. In December 1994, for example, the American Anthropological Association (AAA) adopted a "Statement on 'Race' and Intelligence" which read in part:

> The American Anthropological Association (AAA) is deeply concerned by recent public discussions which imply that intelligence is biologically determined by race. Repeatedly challenged by scientists, nevertheless these ideas continue to be advanced. Such discussions distract public and scholarly attention from and diminish support for the collective challenge to ensure equal opportunities for all people, regardless of ethnicity or phenotypic variation.

Earlier AAA resolutions against racism (1961, 1969, 1971, 1972) have spoken to this concern. The AAA further resolves:

> WHEREAS all human beings are members of one species, *Homo sapiens*, and
>
> WHEREAS differentiating species into biologically defined "races" has proven meaningless and unscientific as a way of explaining variation (whether in intelligence or other traits),
>
> THEREFORE, the American Anthropological Association urges

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

> the academy, our political leaders and our communities to affirm, without distraction by mistaken claims of racially determined intelligence, the common stake in assuring equal opportunity, in respecting diversity and in securing a harmonious quality of life for all people.

The American Association of Physical Anthropologists soon followed suit. Their 1996 "AAPA Statement on Biological Aspects of Race" was originally published in the *American Journal of Physical Anthropology* (which had earlier published the UNESCO Statement) and was reprinted in the *1998/99 Annual Edition of Physical Anthropology*. In fact, the AAPA did not deny the validity of race but, by carefully worded ambiguity, attempted to obscure its meaning out of existence. Point 11 of the AAPA Statement reads:

> Although heredity influences the behavioral variability of individuals within a given population, it does not affect the ability of any such population to function in a given social setting. The genetic capacity for intellectual development is one of the biological traits of our species essential for its survival. This genetic capacity is known to differ among individuals. The peoples of the world today appear to possess equal capacity for assimilating any human culture. Racist political doctrines find no foundation in scientific knowledge concerning modern or past human populations.

In September 1997, the AAA drafted yet another statement in *Anthropology Newsletter* and invited commentaries. A final version of the AAA draft was adopted by the Executive Board on May 17, 1998 and published in the September 1998 (p. 3) issue of *Anthropology Newsletter*. It not only denied that there were gene-based behavioral differences among the races but bordered on Europhobia when it accused White scientists of "fabricating" the concept of race in order to justify slavery, colonialism, and murder. It made no mention of efforts to explain natural variation.

> As they were constructing US society, leaders among European-Americans fabricated the cultural/behavioral characteristics associated with each race, linking superior traits with Europeans

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

and negative and inferior ones to blacks and Indians. Numerous arbitrary and fictitious beliefs about the different peoples were institutionalized and deeply embedded in American thought....

Ultimately race as an ideology about human differences was subsequently spread to other areas of the world....not limited to the colonial situation....During World War II, the Nazis under Adolf Hitler enjoined the expanded ideology of race and racial differences and took them to a logical end: the extermination of 11 million people of "inferior races" (e.g., Jews, Gypsies, Africans, homosexuals and so forth) and other unspeakable brutalities of the Holocaust....

At the end of the 20th century, we now understand that human cultural behavior is learned, conditioned into infants beginning at birth, and always subject to modification....

It is a basic tenet of anthropological knowledge that all human beings have the capacity to learn any cultural behavior....we conclude that present-day inequalities between so-called racial groups are not consequences of their biological inheritance but products of historical and contemporary social, economic, educational and political circumstances.

So now we know! Some discussion of the AAA Statement was hyped in the media. "No Biological Basis for Race, Scientists Say" proclaimed the *San Francisco Chronicle* (February 23, 1998). Science writer Charles Petit quoted the AAA as saying that "The concept of race is a social and cultural construction....Race simply cannot be tested or proven scientifically...It is clear that human populations are not unambiguous, clearly demarcated, biologically distinct groups. The concept of 'race' has no validity...in the human species." Petit went on to add supportive quotes from Jonathan Marks, a well known Berkeley anthropologist, Robert Sussman, an editor of the *American Anthropologist*, and Luigi Cavalli-Sforza, the Stanford University geneticist. He also cited Jefferson Fish, a psychologist at St. John's University in New York who challenged President Clinton's Initiative on Race because he believes the very concept of race is bogus. "This dialogue on race is driving me up the wall," said Fish. "What is race?" The reporter answered for him: "It is a biologically meaningless category."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Other scholarly associations and media pundits also weighed in, although with less extreme a position. "Scientists Dismiss Race as Key to Human Origins" declared *Guardian* writer David Beresford (July 8, 1998). This story, distributed widely by Scripps Howard News, reported on a "dual congress" held by the International Association for the Study of Human Paleontology and the International Association of Human Biologists at Sun City, South Africa. At the conference the question was raised whether the "Out of Africa" theory or the "Multi-Regional" theory of human origins had the most implications for current race differences. At the heart of this argument is whether the *Homo erectus* ancestor who left Africa 1.5 million years ago subsequently gave rise to *Homo sapiens* independently in several geographic regions (the Multi-Regional theory) or whether just one variety of *erectus*, in Africa, gave rise to modern *Homo sapiens*, who then went forth a mere 150,000 years ago to replace the remnants of *erectus* (the Out of Africa theory). Christopher Stringer of the British Museum and Sir Walter Bodmer of Oxford University were cited as part of the growing consensus in favor of the Out of Africa theory – and to argue this meant there had been too little time for the races to have genetically diverged very far.

In fact, of course, whether one adheres to the Multi-Regional or the Out of Africa theory (this author agrees with Out of Africa), the amount of racial variation in various traits (including brain size – see below) cannot be wished into non-existence. Like them or not, the observed racial differences are there for anyone who cares to observe them. No theoretical sleight of hand can make them disappear. The argument about too little time actually turns evolution upside down. As Sarich (1995, p. 86) points out, "it is the Out of Africa model, not that of regional continuity, which makes racial differences more functionally significant. It does so because the amount of time involved in the raciation process is much smaller, while obviously, the degree of racial differentiation is the same – large. The shorter the period of time required to produce a given amount of morphological difference, the more selectively important the differences become."

Those objecting to the concept of race like to argue that taxonomic definitions are arbitrary and subjective. For example, race-critic Jared Diamond, in the 1994 issue of *Discover* Magazine, surveyed half a dozen geographically variable traits and was able to

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

form a number of very different pseudo-races depending on which traits he picked. Classifying people using anti-malarial genes, lactose tolerance, fingerprint patterns, or skin color resulted in the Swedes of Europe being placed in the same category as the Xhosa and Fulani of Africa, the Ainu of Japan, and the Italians of Europe.

Diamond's classifications, however, are nonsensical. They are far more arbitrary than the traditional classifications because the traits he singles out for classifying have little, if any, predictive value beyond the initial classification. Such schemes are not only confused, but dishonest, because they deliberately side-step the long accepted scientific meaning of race – a recognizable (or distinguishable) *geographic* population based on *common descent.*

Race as a Biological Concept

Deconstructing the concept of race not only goes against the tendency of virtually every known culture to classify and build family histories according to some measure of common descent, it also ignores the work of biologists studying non-human species. Ever since 1758, when the Swedish naturalist Carolus Linnaeus created the classification system still used in biology today, most zoologists have recognized at least the four human subdivisions that Linnaeus categorized: Asians, American Indians, Europeans, and Africans. (Technically, some would group the first two Linnaean subdivisions together, thus yielding three major races, often termed, Mongoloids, Caucasoids, and Negroids.) Most researchers since Linnaeus have accepted these four and added the Australian Aborigines, Pacific Islanders, and some other numerically minor groups. Others have made finer subdivisions within each major group.

A race is what zoologists term a variety or subdivision of a species. Each race (or variety) is characterized by a more or less distinct combination of inherited morphological, behavioral, and physiological traits. In flowers, insects, and non-human mammals, zoologists consistently and routinely study the process of racial differentiation. Formation of a new race takes place when, over several generations, individuals in one group reproduce more frequently among themselves than they do with individuals in other groups. This process is most apparent when the individuals live in diverse geographic areas and therefore evolve unique, recognizable

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

adaptations (such as skin color) that are advantageous in their specific environments. But differentiation also occurs under less extreme circumstances. Zoologists and evolutionists refer to such differentiated populations as races. (Within biology, races are termed subspecies.) Zoologists have identified two or more races (subspecies) in most mammalian species.

Scientists do not believe that human beings are exempt from biological classification. In everyday life, as in evolutionary biology, a "Negroid" is someone whose ancestors were born in sub-Saharan Africa, and likewise a "Caucasoid" is someone whose ancestors originated in Europe or the Middle East and a "Mongoloid" is someone whose ancestors originated in east Asia. This definition fits with the temporal bounds offered by the out of Africa theory of human evolution mentioned at the beginning of the article. Thus, according to the estimates prvided by Cavalli-Sforza et al (1994) since *Homo sapiens* first appeared in Africa about 200,000 years ago, branched off into the Middle East and Europe about 110,000 years ago, and into Eastern Asia 70,000 years after that, a Negroid is someone whose ancestors, between 4,000 and (to accommodate recent migrations) 20 generations ago, were born in sub-Saharan Africa. Similarly, a Caucasoid is someone whose ancestors were born in the Middle East or Europe, and *mutatis mutandis* for a Mongoloid.

On average, the Chinese, Koreans, and Japanese are more similar to each other and are different from Australians, Israelis and the Swedes, who in turn are similar to each other and are different from Nigerians, Kenyans, and Jamaicans. Of course, individuals vary greatly within each racial group. It is correct to point out that the variation within each race is extremely large, that there is disagreement as to exactly how many races there are, and that there is a blurring of category edges because of admixture. But it is an error when critics claim that classifications are arbitrary. Although some social concepts of race correlate poorly with biological relationships (Hispanics, for example, are not biologically an identifiable "race," but represent a variety of admixtures of diverse racial components), self-identification generally accords quite well with the physical evidence.

Also, just as some plant and animal sub-species represent either intermixed or historically intermediate forms, many human

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

populations are also mixed. Thus while clear distinctions identify the central tendency of the Mongoloid, Caucasoid, and Negroid people, many intermediate forms, representing genetic gradients, can be found. Interbreeding of diverse racial types, as a result of population mobility in today's world, is also affecting the human biological scene.

Yet despite all this, human racial variation is still marked by obvious differences in skeletal morphology, hair and facial features, as well by blood groups and DNA fingerprints. Forensic anthropologists regularly classify skeletons of decomposed bodies by race. For example, narrow nasal passages and a short distance between eye sockets identify a Caucasoid person, distinct cheekbones characterize a Mongoloid person, and nasal openings shaped like an upside down heart typify a Negroid person (Ubelaker & Scammel, 1992). In certain criminal investigations, the race of a perpetrator can be identified from blood, semen, and hair samples. To deny the predictive validity of race at this level is nonscientific and unrealistic.

Some Historical Context

It is noteworthy that this Statement on Race is appearing in the *Mankind Quarterly* whose opening editorial in July 1960 (nearly 40 years ago) called for a new journal devoted to race research. That same editorial criticized the anthropology of its day for having abandoned the Darwinian evolutionary tradition. Appropriately enough, the very first article in *MQ* was by Sir Charles Darwin (1887-1962), grandson of the famous naturalist, on the subject of "World Population."

Mainstream anthropology immediately charged *MQ* with "racism." *Current Anthropology* opened its pages to Juan Comas (1961), who published a long article with the inflammatory title of "'Scientific' Racism Again?" This article attacked the *MQ* and its editors, denied the evidence of Black-White differences in brain size, defended the culture theory of race differences in intelligence and crime, and reprinted the 1952 UNESCO "Statement on the Nature of Race and Race Differences" (commonly known as the "Statement on Race"). *MQ* was also denounced in such journals as *Race*, *Man*, and *Science*. However, the editors of *MQ* stuck to their guns and fired back. For example, Henry E. Garrett (1960a, 1960b) challenged the 100% culture hypothesis of Black-White differences in intelligence,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

set out the hereditarian perspective, and defended *MQ* against charges of racism.

Those 40-year-old debates over race differences clearly touched on deeply held values. Both sides often displayed an intemperate tone. Politics intruded then, just as it does today. But the debates of that time seem to me to have had more structure and substance than those of today. There appeared to be at least an illusion of possible scholarly resolution. Discussion in those days centered primarily on the causes of the gap in school achievement between Blacks and Whites in the U.S., and whether desegregation and school busing would diminish it. The protagonists were identified as "hereditarians" (those who believed in a partly genetic hypothesis for Black-White differences), and "environmentalists" (who attributed the differences to poverty, relative deprivation, poor schools, and racism). Today, unfortunately, the debate has been deconstructed.

Indeed, nothing in the history of the social sciences has been so persistently intrusive as the issue of the relative importance of genetic and environmental determinants of behavior, especially of Black-White differences (Degler, 1991). Ever since World War I, when widespread testing began, Blacks have averaged lower IQ scores than Whites, at several age levels, under a variety of conditions, and in Canada and the Caribbean as well as in the U.S. (see reviews by Shuey [1958, 1966], Osborne & McGurk [1982], Jensen [1998], and others). Despite an overlap of 10-30 percent, which means that many Blacks obtained scores above the White mean, the average differences persisted and were statistically significant.

The current instantiation of the controversy dates from the publication of Arthur R. Jensen's (1969) controversial monograph in the *Harvard Educational Review*. Jensen presented several propositions: (1) IQ tests measure a general-ability dimension of great social relevance; (2) individual differences on this dimension have a high heritability; (3) educational programs have proved generally ineffective in changing the relative status of individuals and groups on this dimension; (4) social mobility is linked to ability, so social-class differences in IQ probably have an appreciable genetic component; and (5) Black-White differences in IQ probably have a genetic component.

The publication of *The Bell Curve* (Herrnstein & Murray, 1994)

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

unleashed yet another torrent of debate. The book reported original analyses of 11,878 youths (3,022 of whom were Black) from the 12-year National Longitudinal Survey of Youth (NLSY). Most 17-year-olds with high scores on the Armed Forces Qualification Test (Black as well as White) went on to occupational success by their late 20s and early 30s whereas many of those with low scores went on to welfare dependency. The average IQ for African Americans was found to be lower than those for Latino, White, Asian, and Jewish Americans (85, 89, 103, 106, and 115, respectively, pp. 273-278).

Once more, the flashpoint of discussion was whether the Black-White difference in IQ was partly genetic in origin. It was the furor over *The Bell Curve* that had led the AAA to undertake its most recent round of policy statements. It also led the American Psychological Association (APA) to establish an 11 person Task Force to fill an "urgent need" for an authoritative report "about the meaning of intelligence test scores and the nature of intelligence" (Neisser et al. 1996). The Task Force accepted the substantial heritability found for IQ from studies of monozygotic twins who have been reared apart as well as from studies of other kinds of kinship (p. 85). But about race differences in IQ, they concluded: "There is certainly no [empirical] support for a genetic interpretation" (p. 97).

Having just written *Race, Evolution, and Behavior* (Rushton, 1995), describing three distinct racial profiles ranging over 60 anatomical and social variables including brain size, personality and temperament, sexual habits and fertility, and speed of maturation and longevity, I was struck by the amount of evidence sidestepped in the various "Statements" by the AAA, by the APA report, and by other critics. I responded in the February 1996 issue of *Current Anthropology,* in the January 1997 issue of the *American Psychologist*, and in a 1996 Internet posting. This is an update to the ongoing discussion.

Review of Current Race Differences

Much has been learned about Black-White differences since the original debates in this journal. Indeed, the debate has been greatly extended to include Orientals, and data from around the world, not just the U.S. The debate has also been widened to include variables beyond IQ. In my 1995 book, I review the behavioral, morphological,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

and physiological differences between the three major human races – Mongoloid, Caucasoid, and Negroid – and show that these statistical differences are constant across both historical time, national boundaries, and political and economic systems.

Because the very earliest debates in *MQ* were primarily about the nature of Black-White differences in IQ, I will focus on this issue here. Those early protagonists, like Henry E. Garrett (1960a, 1960b), turn out to have been correct about the heritable nature of Black-White differences. Some of this confirmatory work was in fact published in the *MQ,* the best known of which is probably Richard Lynn's (1991a, 1991b) review of the worldwide distribution of intelligence which was brought to wide attention by the publication of Herrnstein and Murray's (1994) *The Bell Curve*. I will also review the relationship between intelligence and brain size, the worldwide distribution of brain size, and finally the heritability of intelligence. Few of the race debunkers are willing to acknowledge any of these data, though they grow stronger every day. Readers seeking a more extensive summary can consult Herrnstein and Murray's (1994) *The Bell Curve*, Levin's (1997) *Why Race Matters,* Jensen's (1998) *The g Factor,* or my own (1995) *Race, Evolution, and Behavior.*

1. The geographical distribution of intelligence. As documented by these authors, one hundred years of research has established that East Asians and Europeans average higher IQs than do Africans. Various East Asian populations measured in North America and in Pacific Rim countries typically average IQs in the range of 101 to 111. Whites in North America typically average IQs between 100 and 105 African populations living south of the Sahara, in North America, in the Caribbean, and in Britain typically have mean IQs from 70 to 90 (see Lynn, 1997, for a recent review).

Parallel differences are found on relatively culture-free tests such as speed of decision making. Probably the simplest culture free mental tests are reaction time tests. In the "odd-man-out" test, Nine to twelve year-old children look at a set of lights. They have to decide which one goes on, and then press the button closest to that light. The test is so easy that all children can do it in less than one second. Even here, children with higher IQ scores are faster than lower IQ children. Around the world, Oriental children are faster than White

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

children who in turn are faster than Black children (Jensen, 1998).

2. The relationship between intelligence and brain size. Remarkable discoveries have been made during the 1990's Decade of the Brain using magnetic resonance imaging (MRI). These MRI studies, which construct three-dimensional models of the brain *in vivo*, show a correlation of about 0.40 between brain size and IQ, as replicable a set of results as can be found in the social and behavioral sciences. The first MRI/IQ studies were published in the late 1980s and early 1990s in leading, refereed, mainstream journals like *Intelligence* (Willerman et al., 1991) and the *American Journal of Psychiatry* (Andreasen et al., 1993). My article "Brain Size and Cognitive Ability" in the 1996 issue of the journal *Psychonomic Bulletin and Review* (Rushton & Ankney, 1996) surveyed all the published literature on this topic. The MRI brain size/IQ correlation of .44 is as high as the correlation between social class at birth and adult IQ.

3. The parallel geographical distribution of brain size. Racial differences in brain size have been established recently using wet brain weight at autopsy, volume of empty skulls using filler, volume estimated from head sizes, and MRI. Using brain mass at autopsy, Ho et al. (1980) reported a 100 gram difference in brain weight between Whites and Blacks in the U.S. Using endocranial volume Beals, Smith and Dodd (1984, p. 307, Table 5) analyzed about 20,000 skulls from around the world. East Asians and Europeans averaged 1,389 cm^3 while Africans averaged 1,268 cm^3. Using external head measures to calculate cranial capacities, Rushton (1992) analyzed a sample of thousands of U.S. Army personnel. Even after correcting for body size, Asian and European Americans averaged 1,398 cm^3, while African Americans averaged 1,359 cm^3. Rushton (1994) reported a study of tens of thousands of men and women collected by the International Labour Office in Geneva, Switzerland. Head sizes (corrected for body size) were larger for East Asians and Europeans than for Blacks. Moreover, a recent MRI study found that people of African and Caribbean background averaged a smaller brain volume than did those of European background (Harvey, Persaud, Ron, Baker & Murray, 1994).

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

These racial differences in brain size show up early in life. In an analysis of data from the U.S. National Collaborative Perinatal Project on 35,000 children, Rushton (1997a) found that Asian and White children averaged a larger head perimeter than did Black children, even though, at age seven, Black children had the largest body size. Further, head perimeter at seven years correlates with IQ at age seven in all three racial groups.

4. The heritability of intelligence. The heritability of intelligence is now well established from numerous adoption, twin, and family studies. Particularly noteworthy are the heritabilities of around 80% found in adult twins reared apart (Bouchard, Lykken, McGue, Segal & Tellegen, 1990). Moderate to substantial genetic influence on IQ has also been found in studies of non-Whites, including African Americans and Japanese. Even the most critical of meta-analyses find IQ about 50% heritable (Devlin, Daniels & Roeder, 1997).

Transracial adoption studies suggest a genetic contribution to the between-group differences. Korean and Vietnamese children adopted into White American and Belgian families show that, although as babies many came from poor backgrounds and were malnourished, when they grew up they excelled in school. The IQs of the adopted Oriental children were 10 or more points higher than the national average for the country they grew up in (Frydman & Lynn, 1989). By contrast, Weinberg, Scarr and Waldman (1992) found that at age 17, Black and Mixed-Race children adopted into White middle-class families performed at a lower level than the White siblings with whom they had been raised.

5. Violent crime, AIDS, and sexuality. INTERPOL data from the 1980s and 1990s shows the same racial pattern in violent crime that occurs within the U.S. also occurs internationally. Asian and European countries have an average rate of homicide, rape, and serious assault that is less than one quarter that of African and Caribbean countries.

One neurohormonal contributor to crime is testosterone. Studies show that Black college students and military veterans have 3% to 19% more testosterone than their White counterparts. Sex hormones are circulated throughout the body and are known to

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

activate many brain-behavior systems involving aggression and reproduction. For example, around the world the rate of two-egg twinning (caused by a double ovulation), is twice as high in Africans as in Asian and Europeans (16, 8, and 4 per 1,000, respectively). The differences in multiple birthing are known to be heritable through the race of the mother regardless of the race of the father, as found in European/African matings in Brazil.

Testosterone may also play a part in sexual behavior. A similar international racial pattern is found for measures of sexual activity and frequencies of sexually transmitted diseases such as AIDS. The 1997 U.S. syphilis rate for Blacks was 24 times the rate it was for Asians and Whites. Racial differences in AIDS/HIV are increasingly well known. Currently 8 out of every 100 Africans are infected with the AIDS virus. In South Africa, the estimates are that about 10 % of the adult population is living with HIV. In some areas of Africa the AIDS rate reaches 70%. Less well known is that HIV infection rates are also high in the Black Caribbean, about 2%. Thirty-three percent of the AIDS cases are women. This high figure of women means the transmission is mainly from heterosexual intercourse. The high rate of HIV in the 2,000 mile band of Caribbean countries extends from Bermuda to Guyana, and it seems to be the highest in Haiti, with a rate over 5%.

Black Americans also have high HIV rates, similar to Blacks living in the Caribbean and Africa. Three percent of Black men and 1% of Black women in the U.S. are living with HIV. The rate for White and Asian Americans is less than 0.1%. Of course AIDS is a serious public health problem for all racial groups, but it is especially so for Africans and people of African ancestry.

Conclusion

The ongoing campaign to deconstruct race as a biological concept needs to be countered by a careful examination of what we do and do not know about human variation. Academicians, journalists, and editorialists have an obligation to review the evidence cited here before offering any further comment on this controversial topic. Moreover, those in academia and the media need to be aware that major efforts are being made throughout Europe and Canada to stifle free discussion of race by tightening so-called "hate-laws" and,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

in the U.S.A., to restrict the way research can be conducted (and funded). Implementation of such policies threatens the general principles of free speech, open inquiry, and academic freedom and tenure (Pearson, 1997).

Publication of Herrnstein and Murray's (1994) *The Bell Curve* brought widespread public attention to the research on race that has been accumulating over the last 30 years in technical and specialist journals that demonstrably challenges each and every article of the dogma of biological egalitarianism. Startling, and alarming to many, is the conclusion that follows from these data that if all people were treated the same, most average race differences would not disappear. With egalitarianism under siege, there has been a major effort to get the "race genie" back in the bottle, to squeeze the previously tabooed toothpaste back into the tube, to suppress or deny the latest scientific evidence on race, genetics, and behavior.

Regardless of the extent to which the media promote "politically correct," but scientifically wrong, resolutions from professional societies such as the American Anthropological Association, facts remain facts and require appropriate scientific, not political or ideological, explanation.

None of this should be construed as meaning that environmental factors play no part in individual and group differences. But with each passing year and each new study, the evidence for the genetic contribution to these differences becomes more firmly established than ever.

References

AAA (1998, September). American Anthropological Association Statement on "Race." *Anthropology Newsletter, 39,* 3.

AAPA (1996). AAPA Statement on Biological Aspects of Race. *American Journal of Physical Anthropology, 101,* 569-570.

Andreasen, N. C., Flaum, M., Swayze II, V., O'Leary, D. S., Alliger, R., Cohen, G., Ehrhardt, J., & Yuh, W. T. C. (1993). Intelligence and brain structure in normal individuals. *American Journal of Psychiatry, 150,* 130-134.

Beals, K. L., Smith, C. L., & Dodd, S. M. (1984). Brain size, cranial morphology, climate, and time machines. *Current Anthropology, 25,* 301-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

330.

Boas, F. (1894). Human faculty as determined by race. *Proceedings of the American Association for the Advancement of Science, 43*, 301-327. [Reprinted in G. W. Stocking Jr. (Ed.), *The Shaping of American Anthropology, 1883-1911. A Franz Boas Reader*. New York: Basic Books, 1974.]

Boas, F. (1910, December). The real race problem. *The Crisis, 7*. [Cited in V. J. Williams, Jr., *Rethinking Race: Franz Boas and His Contemporaries*, Lexington, KY: University Press of Kentucky, 1996.]

Boas, F. (1911). *The Mind of Primitive Man*. New York: Macmillan.

Bouchard, T. J. Jr., Lykken, D. T., McGue, M., Segal, N. L., & Tellegen, A. (1990). Sources of human psychological differences: The Minnesota study of twins reared apart. *Science, 250*, 223-228.

Broca, P. (1873). Sur les cranes de la caverne de l'Homme-Mort (Lozere). Revue d"Anthropologie, 2, 1-53. [Data cited in V. J. Williams, Jr., *Rethinking Race: Franz Boas and His Contemporaries*, Lexington, KY: University Press of Kentucky, 1996.]

Comas, J. (1961). "Scientific" racism again? *Current Anthropology, 2*, 303-340.

Darwin, C. (1871). *The Descent of Man*. London: Murray.

Degler, C. N. (1991). *In Search of Human Nature*. New York: Oxford University Press.

Devlin, B., Daniels, M., & Roeder, K. (1997). The heritability of IQ. *Nature, 388*, 468-471.

Frydman, M., & Lynn, R. (1989). The intelligence of Korean children adopted in Belgium. *Personality and Individual Differences, 10*, 1323-1326.

Garrett, H.E. (1960a). Klineberg's chapter on race and psychology: A review. *Mankind Quarterly, 1*, 15-22.

Garrett, H.E. (1960b). The scientific racism of Juan Comas. *Mankind Quarterly, 1*, 100-106.

Harvey, I., Persaud, R., Ron, M. A., Baker, G., & Murray, R. M. (1994). Volumetric MRI measurements in bipolars compared with schizophrenics and healthy controls. *Psychological Medicine, 24*, 689-699.

Herrnstein, R. J., & Murray, C. (1994). *The Bell Curve*. New York: Free Press.

Ho, K. C., Roessmann, U., Straumfjord, J. V., & Monroe, G. (1980). Analysis of brain weight. *Archives of Pathology and Laboratory Medicine, 104*, 635-645.

Jensen, A. R. (1969). How much can we boost IQ and scholastic achievement? *Harvard Educational Review, 39*, 1-123.

Jensen, A. R. (1998). *The g Factor*. Westport, CT: Praeger.

Levin, M. (1997). *Why Race Matters*. Westport, CT: Praeger.

Lynn, R. (1991a). Race differences in intelligence: A global perspective. *Mankind Quarterly, 31*, 255-296.

Lynn, R. (1991b). The evolution of racial differences in intelligence (with

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

commentaries and author's response). *Mankind Quarterly, 32*, 99-173.

Lynn, R. (1997).Geographical variation in intelligence. In H. Nyborg (Ed.), *The Scientific Study of Human Nature: Essays in Honor of H.J. Eysenck.* Oxford: Elsevier.

Neisser, U., Boodoo, G., Bouchard, T. J. Jr., Boykin, A. W., Brody, N., Ceci, S. J., Halpern, D., Loehlin, J. C., Perloff, R., Sternberg, R. J., & Urbina, S. (1996). Intelligence: Knowns and unknowns. *American Psychologist, 15*, 77-101.

Osborne, R. T., & McGurk, F. C. J. (1982). (Eds.), *The Testing of Negro Intelligence, Vol. 2.* Athens, GA: Foundation for Human Understanding.

Pearson, R. (1997). *Race, Intelligence, and Bias in Academe (2nd edition).* Washington, DC: Scott-Townsend.

Rushton, J. P. (1992). Cranial capacity related to sex, rank, and race in a stratified random sample of 6,325 U.S. military personnel. *Intelligence, 16*, 401-413.

Rushton, J. P. (1994). Sex and race differences in cranial capacity from International Labour Office data. *Intelligence, 19*, 281-294.

Rushton, J. P. (1995). *Race, Evolution, and Behavior: A Life History Perspective.* New Brunswick, NJ: Transaction.

Rushton, J. P. (1996). The eternal triangle: Race, class, and IQ. [Discussion of the book *The Bell Curve*]. *Current Anthropology, 37*, S168-S172.

Rushton, J. P. (1997a). Cranial size and IQ in Asian Americans from birth to age seven. *Intelligence, 25*, 7-20.

Rushton, J. P. (1997b). Race, IQ, and the APA Report on *The Bell Curve. American Psychologist, 52*, 69-81.

Rushton, J. P. (1997c). Review essay. [Review of the books *The Bell Curve Debate, The Bell Curve Wars, Final Solutions, The Mismeasure of Man, The Nazi Connection, The Race Gallery, and The Science and Politics of Racial Research.] Society, 34*, 78-82.

Rushton, J. P., & Ankney, C. D. (1996). Brain size and cognitive ability: Correlations with age, sex, social class, and race. *Psychonomic Bulletin and Review, 3*, 21-36.

Sarich, V. M. (1995). In Defense of *The Bell Curve. Skeptic, 3*(3), 84-93.

Shuey, A. M. (1958). *The Testing of Negro Intelligence.* Lynchburg, VA: Bell.

Shuey, A. M. (1966). *The Testing of Negro Intelligence* (2nd ed.). New York: Social Science Press.

Ubelaker, D., & Scammel, H. (1992). *Bones: A Forensic Detective's Casebook.* New York: HarperCollins.

Weinberg, R. A., Scarr, S., & Waldman, I. D. (1992). The Minnesota Transracial Adoption Study: A follow-up of IQ test performance at adolescence. *Intelligence, 16*, 117-135.

Willerman, L., Schultz, R., Rutledge, J. N., & Bigler, E. D. (1991). In vivo brain size and intelligence. *Intelligence, 15*, 223-228.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The Bronze Age and Early Iron Age Peoples of Eastern Central Asia
Victor H. Mair (Ed.)
Institute for the Study of Man, 1998
ISBN 0-941694-63-1 Clothbound 2-volumes pp. iv + 912, with maps and illustrations. $165.00

These two large volumes, consisting of over 900 pages, constitute the most comprehensive body of scholarly investigations on the prehistoric and early historic inhabitants of the Tarim Basin and surrounding areas. The excavation of over 200 such burials has revealed information vital to the understanding of early cultural contact between Eastern and Western Eurasia. This is a new field of research – prompted by the recent discovery of abundant and extremely well-preserved human remains in the region – which has important implications for the origins of the Indo-Europeans and the development of civilization in East Asia. Distinguished authorities from a dozen nations have contributed a total of 46 substantial papers on archaeology, migration, nomadism, linguistics, genetics and physical anthropology, metallurgy, textiles, geography and climatology, history, and mythology and ethnology. A noteworthy feature of the publication is a detailed examination of the relevance of *Tocharian* for the ancient peoples of Eastern Central Asia by six of the world's most distinguished linguists who specialize in this extinct language. The two volumes include over 200 figures and maps, plus an appendix of place, people and site names, as well as a lengthy index.

The Tarim Basin finds are significant not only in revealing the presence of a Caucasoid population in that area some 2-4 though years ago, but in providing evidence for the influence of Western Eurasia on the cultural development of eastern Asia, and subsequent interaction between East and West by way of the steppeland corridor that later came to be called "the silk route."

Scholars for many decades noted the sudden efflorescence of Chinese civilization with the sudden arrival of the bronze age, fully developed, complete with wheeled chariots, swords and a substantial complex of cultural artifacts such as could already be found in Western Eurasia. Early Central Asian explorers had commented on some of the archaeological finds unearthed in the Tarim Basin (Sinkiang), but only in the last part of the present century has extensive archaeological investigation unveiled the extent

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

of the West/East Asian connection – which appears to be ancestral to the coming of the bronze age to China, Korea and Japan.

Recent investigative technology, such as DNA studies, has also expanded our ability to interpret the remarkable range of skeletal data. We find that this parallels the characteristics of the contemporary peoples of Central Europe; and analysis of their well-preserved clothing indicates similar cultural parallels. To heighten the level of speculation, linguists had already determined that Tocharian, a language known to have been spoken in this same area in historical times, half a millennium later, is best classified as a West Indo-European language rather than an East Indo-European language, notwithstanding later contacts and possible migrations from the area of Persian (West Indo-European) influence.

Volume I comprises a series of papers on Archeology, Migration and Nomadism and Linguistics, and contains an admirable introduction by the editor, Victor H. Mair, a sinologist well-acquainted with Western China, which summarizes the significance of the finds for our understanding of early Oriental culture and history. HE Dexiu describes the mummies; AN Zhimin outlines the identifiable cultural complexes in the Bronze Age Tarim basin and surrounding Areas; David W. Anthony describes pastoralism and the opening of the Eurasian Steppes four thousand years ago; Elena E. Kuzmina reveals how pastoralism carried Bronze Age technology eastward via the steppes; and Asko Parpola discusses the Aryan languages that the pastoralists brought with them and the archeology of Sinkiang. Fredrik Hiebert and SHUI Tao discuss Proto-Iranian and the Tarim and Fergano basins in the Bronze Age; J. P. Mallory presents an important survey of the Indo-Europeans in Asia; while Colin Renfrew writes on the Tarim Basin, Tocharian, and Indo-European Origins.

Other papers on Migration and Nomadism include: Karl Jettmar, "Early Migrations in Central Asia"; Natalia I. Shishlina and Fredrik T. Hiehert, "Interaction between Bronze Age Eurasian Nomads and Agriculturalists"; Jeannine Davis-Kimball, "Tribal Interaction between the Early Iron Age Nomads of the Southern Ural Steppes, Semirechive, and Xinjiang"; Claudia Chang and Perry A. Tourtellotte, "The Role of Agro-pastoralism in the Evolution of Steppe Culture during the Saka/Wusun Period (600 BCE-400 CE)"; and Tzehtley C'hiou-Peng outlines the Western affinities of the culture of Western Hunan.

In respect of linguistics, Eric P. Hamp investigates the linguistic origins of Tocharians; Werner Winter writes on "Lexical Archaisms in the Tocharian Languages"; Georges-Jean Pinault, "Tocharian Languages and Pre-Buddhist Culture"; Douglas Q. Adams, "On the History and Significance of Some Tocharian B Agricultural Terms"; and Alexander Lubotsky identifies

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Tocharian Loan Words in Old Chinese – such as the terms for Chariots, Chariot Gear, and Town Building". Further analysis of Tokharian linguistic identity are provided by John Colarusso, Kevin Tuite and by Don Ringe, Tandy Warnow, Ann Taylor, Alexander Michailov, and Libby Levison; while Juha Janhunen writes on "The Horse in East Asia: Reviewing the Linguistic Evidence"; and LIN Meicun writes about "The Earliest Tokharian Loan-words in Ancient Chinese"; Penglin Wang explores, "A Linguistic Approach to Inner Asian Ethnonyms"; and William S-Y. Wang presents "Three Windows on the Past".

Volume 2, "**Genetics and Physical Anthropology,**" commences with an important paper by Paolo Francalacci discussing the results of his DNA analysis of samples from the Tarim Basin mummies, which he finds suggestive of links to the Indo-European population of Europe. Tongmao Zhao describes how the genetic evidence shows that the present-day Uyghurs who live in that area are of mixed Mongoloid-Caucasoid origin, due to a subsequent influx of Mongoloids. HAN Kangxin also surveys the physical anthropology of the Ancient Populations of the Tarim Basin. Ke Peng turns to a study of the Andronovo Bronze artifacts found in Xinjiang, providing further evidence of Indo-European cultural links; Jianjun Mei and Colin Shell write on Copper And Bronze Metallurgy in Late Prehistoric Xinjiang"; Emma C. Bunker discusses the impact of the Tarim Basin culture on ancient Chinese culture; as does Katheryn M. Linduff. E.J. W. Barber and Irene Good both provide papers on the Tarim Basin textiles and their similarities to contemporary textiles in central and northern Europe. The general historical context of the Tarim basin/Indo-European/Chinese contacts is covered by a number of papers authored by Harold C. Fleming, by Kenneth J. Hsü, by Michael Puett, and E. Bruce Brooks. But the exciting possibility of mythological influence on the early East, emanating from the Western Eurasian steppes, is raised in papers by Denis Sinor; and C. Scott Littleton, who asks whether the some of the Xinjiang mummies might not be 'Epi-Scythians.' CHEN Chien-wen writes on the racial, cultural, and ethnic affinities of the Yuezhi; Dolkun Kamberi on the Täklimakanian civilization generally; and Dru C. Gladney, "Ethnogenesis and Ethnic Identity in China: the Uygurs and Kazaks". Finally, editor Victor H. Mair provides a competent summing up, to which he adds, conjointly with Dolkun Kamberi a valuable Appendix surveying in the form of a glossary the "Places, People, and Site Names of the Uyghur Region Pertinent to the Archeology of the Bronze Age and Iron Age"; This magnificent and encyclopedic two-volume monograph is amply provided with maps and illustrations throughout.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

How Good is Your Country?
What You Should Know

Raymond B. Cattell, Ph.D., D.Sc.

Paperback, 144 pages
With Charts, Diagrams and Tables

CONTENTS

The Aims and Methods of Our Enquiry
A Scientific Basis for Comparing Countries
Reflections on What Syntality One Would Desire
Locating Family Types among Nations
Developmental Change
Some Change Factors Mapped in America, Australia and Britain
Desirability of Various Racio-Cultural Experiments
Comparison of Developmental Trends
Interpreting Family Values
The Mystery of Cultural Pressure
A Plan for Proceeding

A unique experiment in determining the relative cultural and biological competence of nations developed by one of the world's leading psychologists.

ISBN 0-941694-44-5 • Price: $25.00 (Post $2.50)
VISA AND MASTERCARD ACCEPTED

The Mankind Quarterly Monograph Series No. 5
P.O. Box 34070, N.W. Washington D.C., 20043
Tel: (202) 371-2700 • Fax: (202) 371-1523

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Ecology and Evolution

Editor: Roger Pearson, Ph.D.

Chap. 1. Ecology, Adaptation and Speciation
Roger Pearson

Chap. 2. Ecosystem and Genetic System
F. J. Irsigler

Chap. 3. Mammalian Societies and the Emergence of the Family System
J. W. Jamieson

Chap. 4. Understanding Human Evolution: Kinship *versus* Social Materialism
Roger Pearson

Chap. 5. Genetic Altruism: Some Hypotheses on Monogamy, Polygyny, Incest Taboo, Exogamy and the Origins of the Family
Umberto Melotti

Chap. 6. Ethics and the Social Sciences
Raymond B. Cattell

---

92 Pages – Extensive Bibliography – ISBN 0-941694-00-3
$15.00 (add $2.50 postage) M/C-Visa Accepted

Institute for the Study of Man
1133 13th St. NW., Suite C-2, Washington DC 20005
Tel: (202) 371-2700 Fax: (202) 371-1523

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED